VOLUME LII
NUMBER FOUR

THE NATIONAL GEOGRAPHIC MAGAZINE

OCTOBER, 1927

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PUBLISHED BY THE
NATIONAL GEOGRAPHIC SOCIETY
HUBBARD MEMORIAL HALL
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ARTICLES and photographs are desired. For material which the Magazine can use, generous remuneration is made. Contributions should be accompanied by an addressed return envelope and postage.

IMMEDIATELY after the terrific eruption of the world's largest crater, Mt. Katmai, in Alaska, a National Geographic Society expedition was sent to make observations of this remarkable phenomenon. Four expeditions have followed and the extraordinary scientific data resulting given to the world. In this vicinity an eighth wonder of the world was discovered and explored—"The Valley of Ten Thousand Smokes," a vast area of steaming, spouting fissures. As a result of The Society's discoveries this area has been created a National Monument by proclamation of the President of the United States.

AT an expense of over $50,000 The Society sent a notable series of expeditions into Peru to investigate the traces of the Inca race. Their discoveries form a large share of our knowledge of a civilization waning when Pizarro first set foot in Peru.

THE Society also had the honor of subscribing a substantial sum to the expedition of Admiral Peary, who discovered the North Pole.

NOT long ago The Society granted $25,000, and in addition $75,000 was given by individual members to the Government when the congressional appropriation for the purpose was insufficient, and the finest of the giant sequoia trees of California were thereby saved for the American people.

THE Society is conducting extensive explorations and excavations in northwestern New Mexico, which was one of the most densely populated areas in North America before Columbus came, a region where prehistoric peoples lived in vast communal dwellings and whose customs, ceremonies, and name have been engulfed in an oblivion.

TO further the important study of solar radiation in relation to long-range weather forecastings, The Society has appropriated $60,000 to enable the Smithsonian Institution to establish a station for four years on Mt. Brukkaros, in Southwest Africa.

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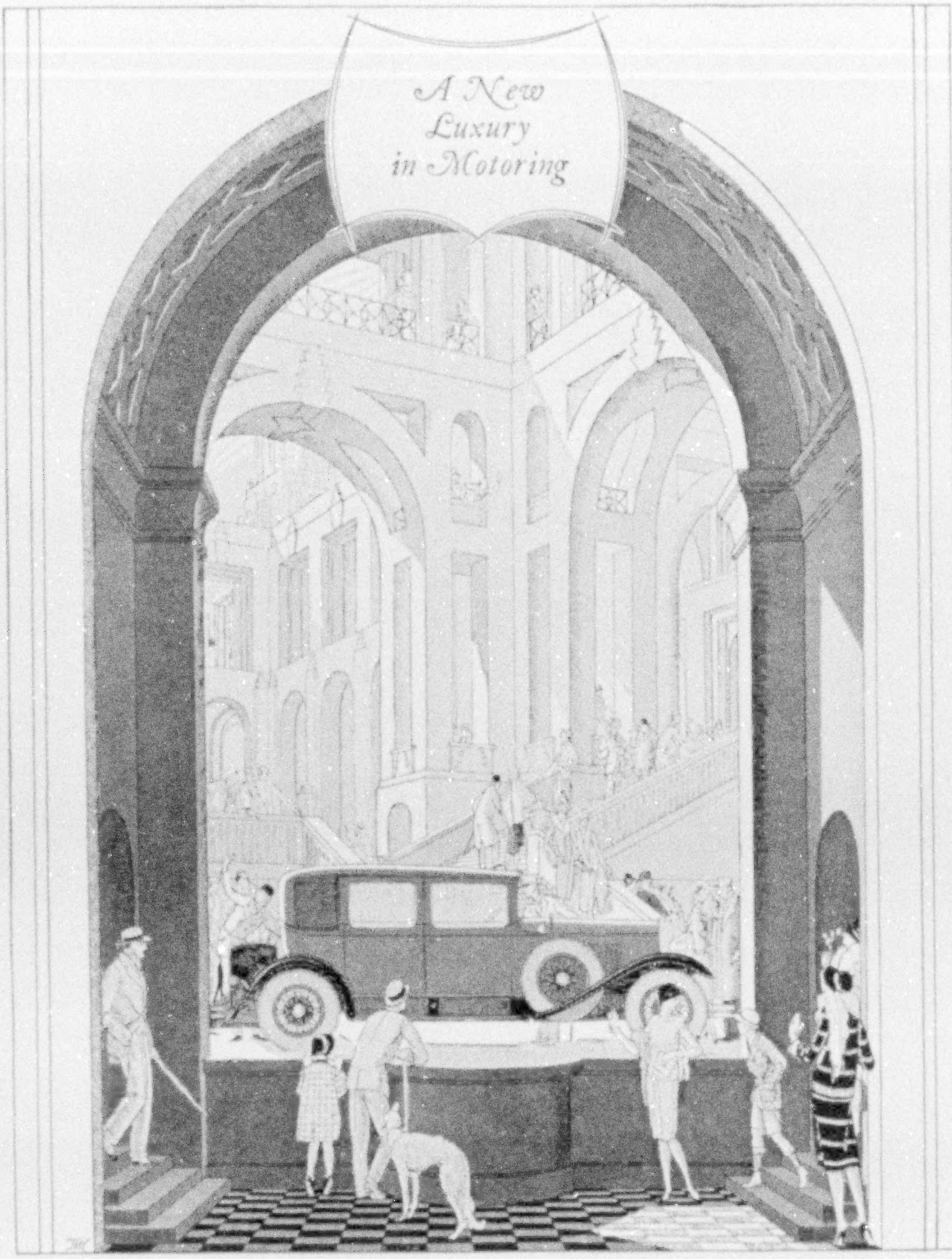

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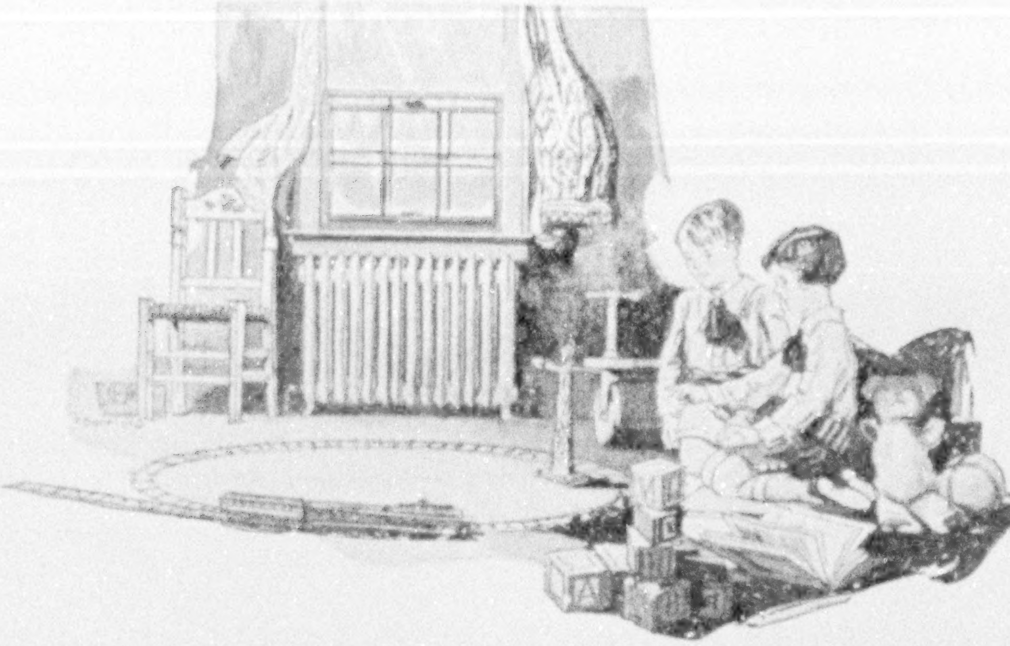

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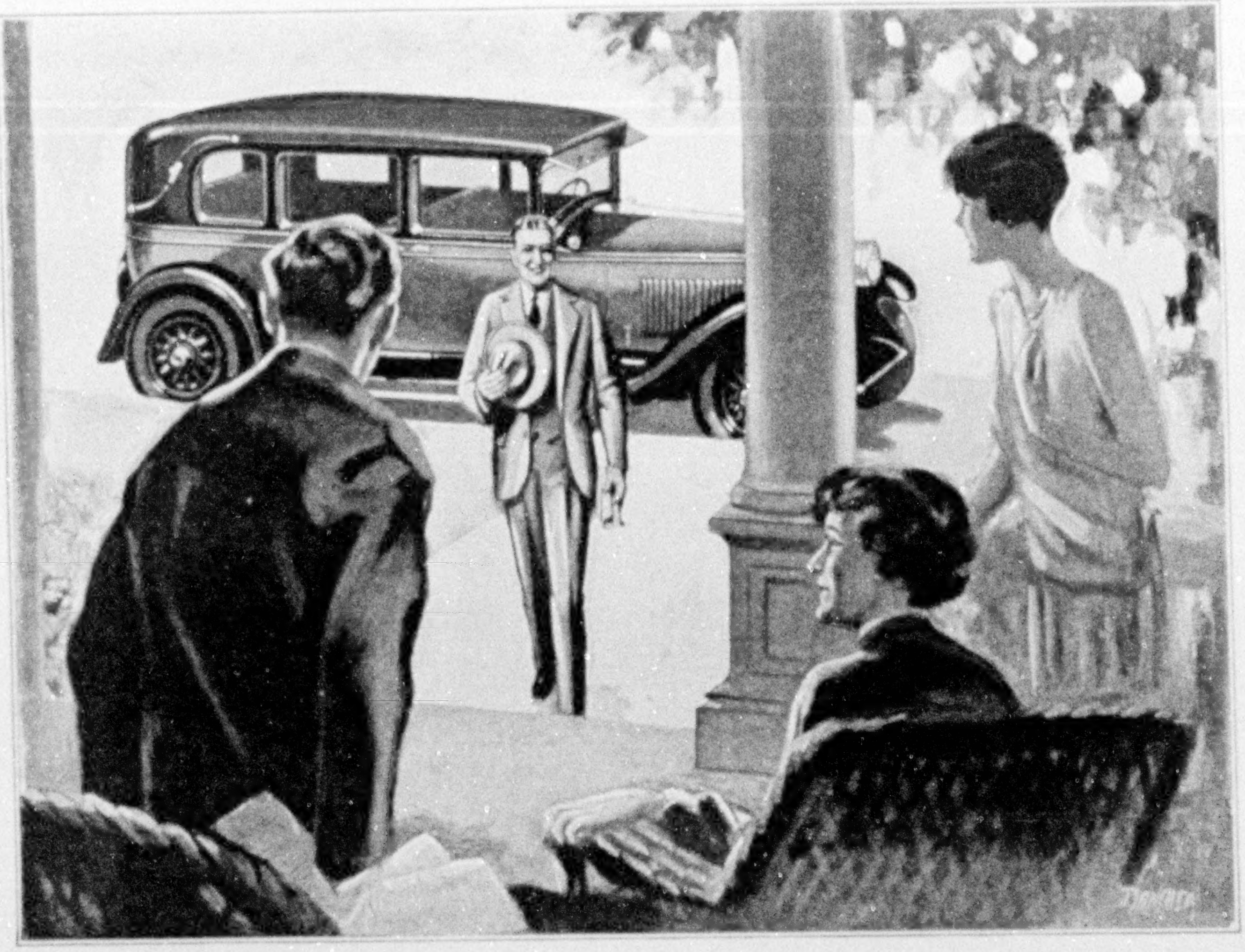

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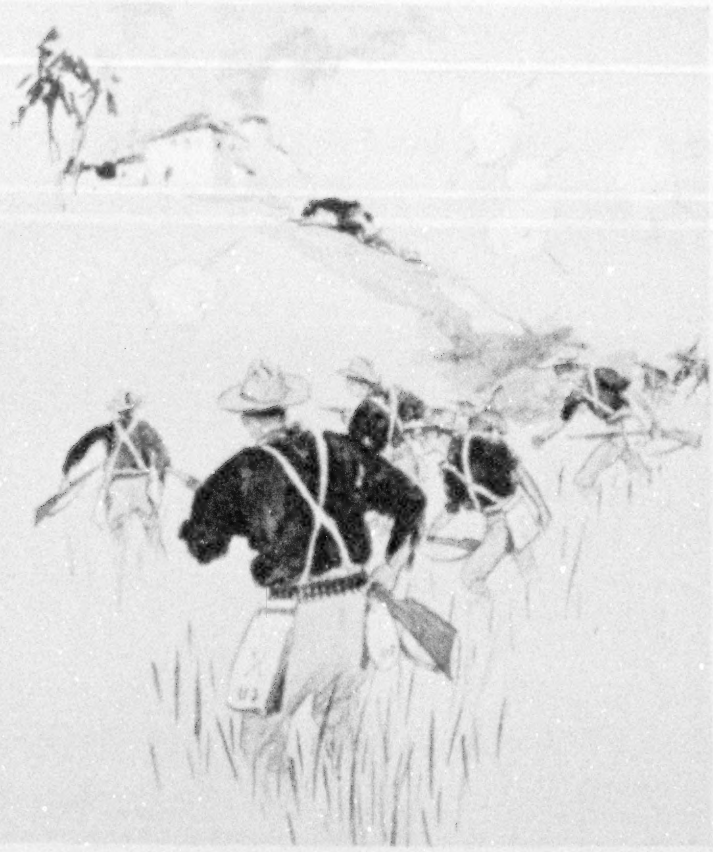

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WATCHES TRUE ALIKE TO THE TIME-MINUTE AND THE STYLE-MINUTE

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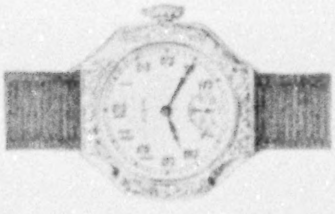
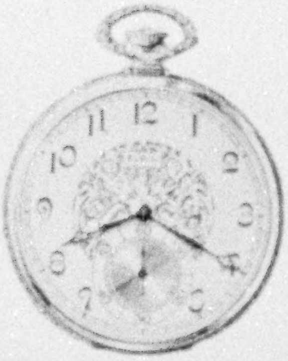
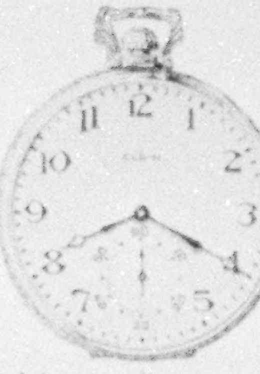


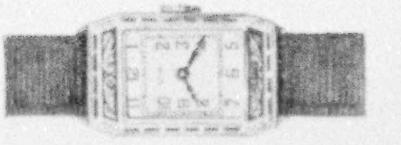
She who wears this bracelet watch has both admiring eyes and the correct time upon her wrist. A 7-jewel movement, in a white 14-karat gold-filled case $30



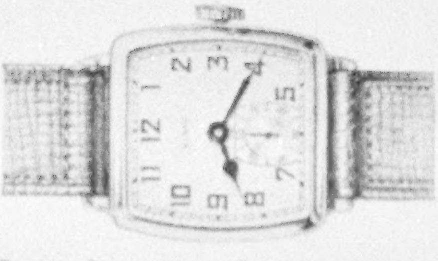
Only out of a long experience in fine watchmaking could come such a watch as this—good to look upon, faithful in service, 17-jewel, yet offered at such a modest price as $40



This watch is an excellent example of the value Elgin ever offers. The case is engraved and made of 14-karat solid white gold. The movement is 17-jewel. The price $60

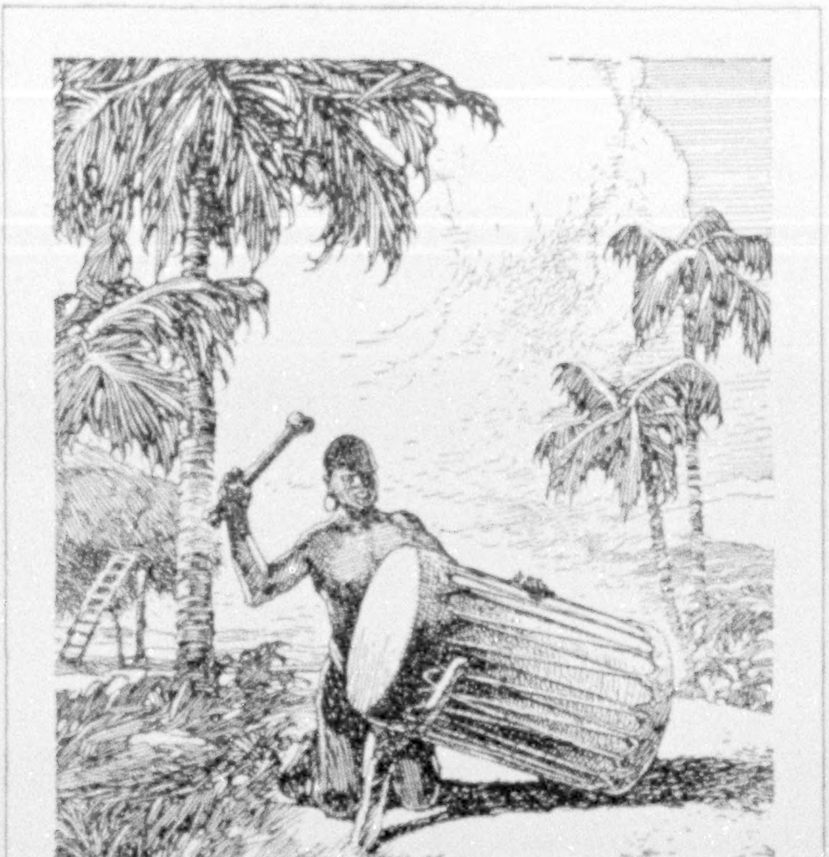


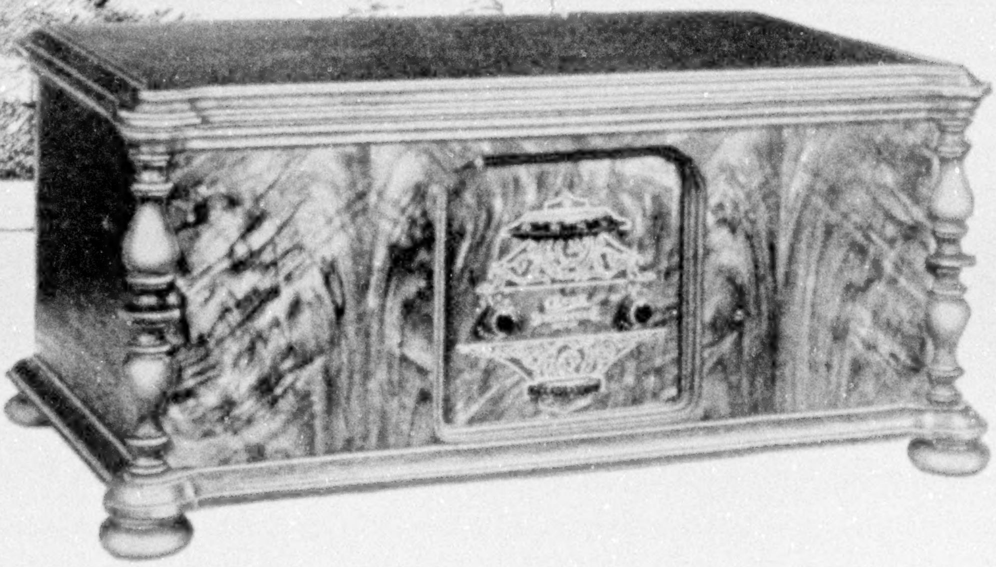
Refinement and beauty are linked with accuracy in this woman's wrist watch. The case is of 14-karat solid white gold, and engraved and enameled $60



Designed to withstand the punishment of sport wear is this man's strap watch . . . a 7-jewel movement in a 14-karat gold-filled case of white or green tone . . . $35

(Prices slightly higher in Canada)





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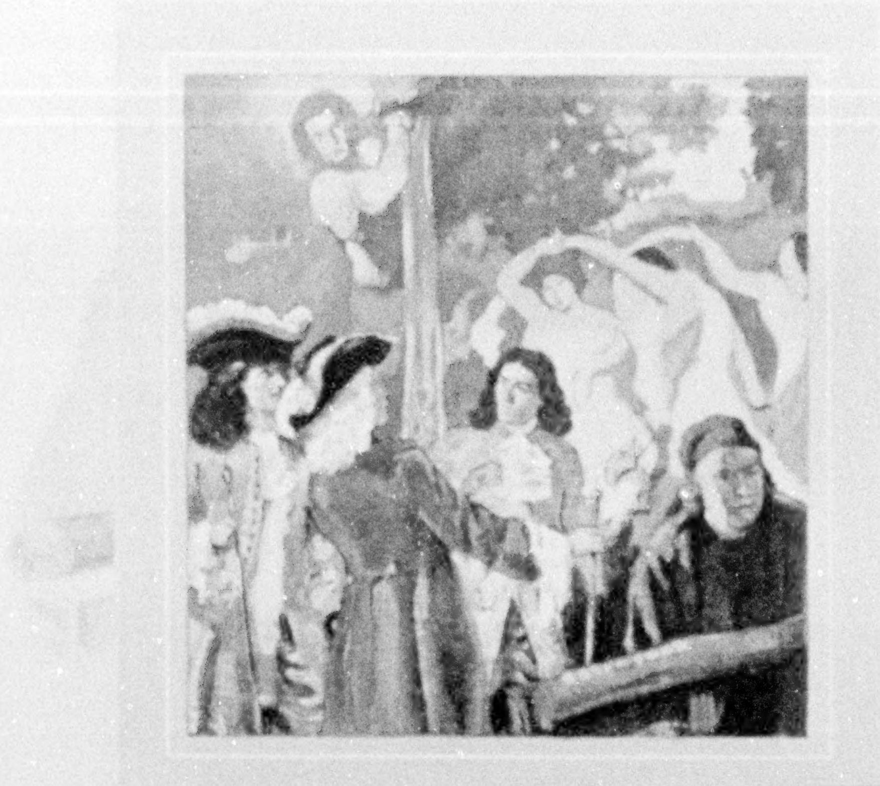

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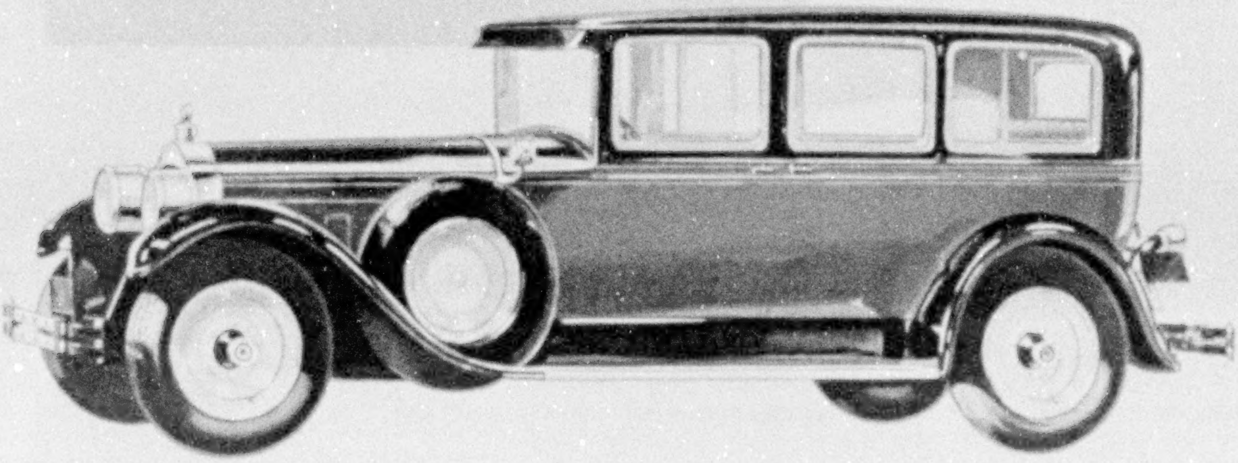

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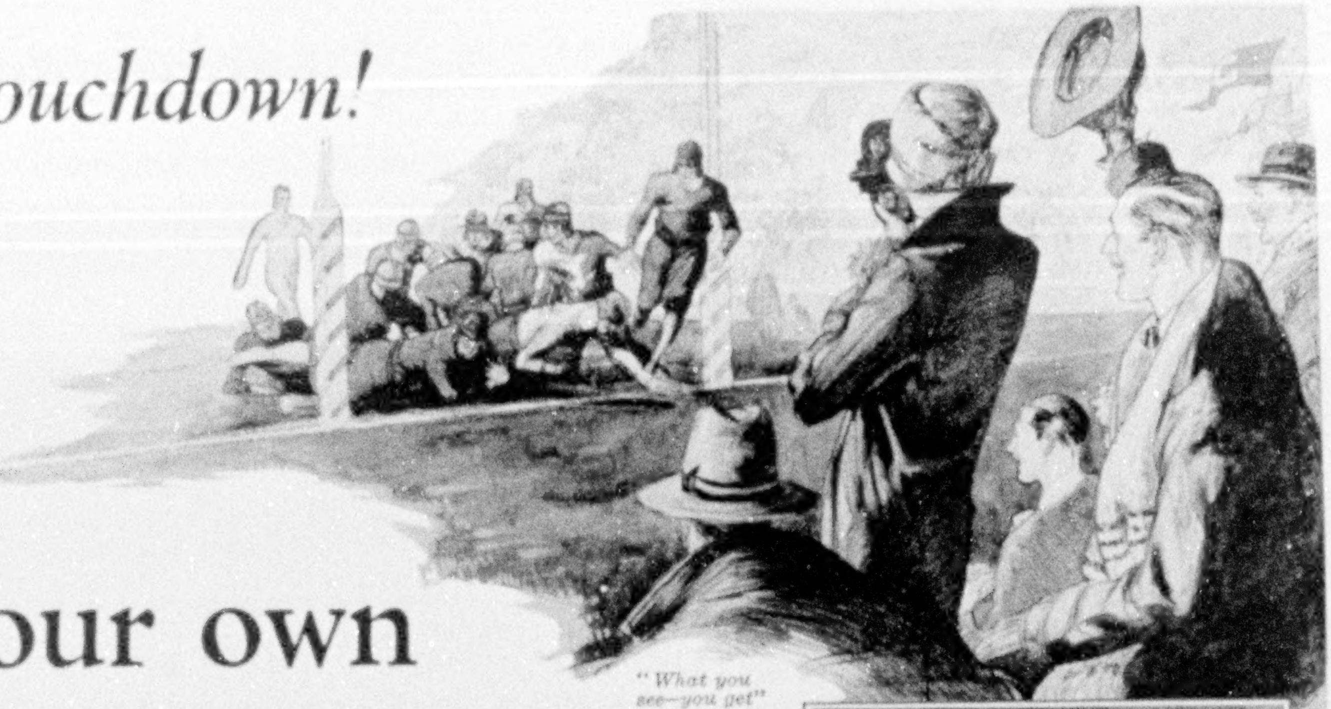

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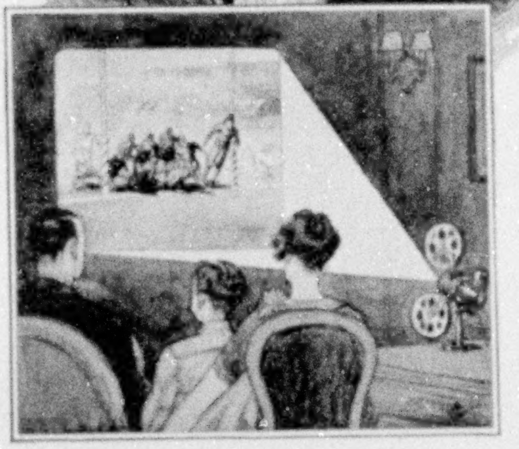
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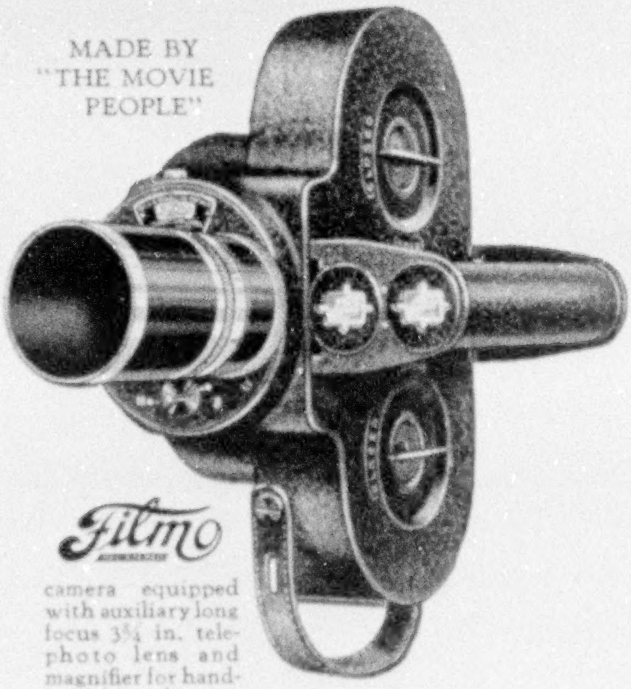

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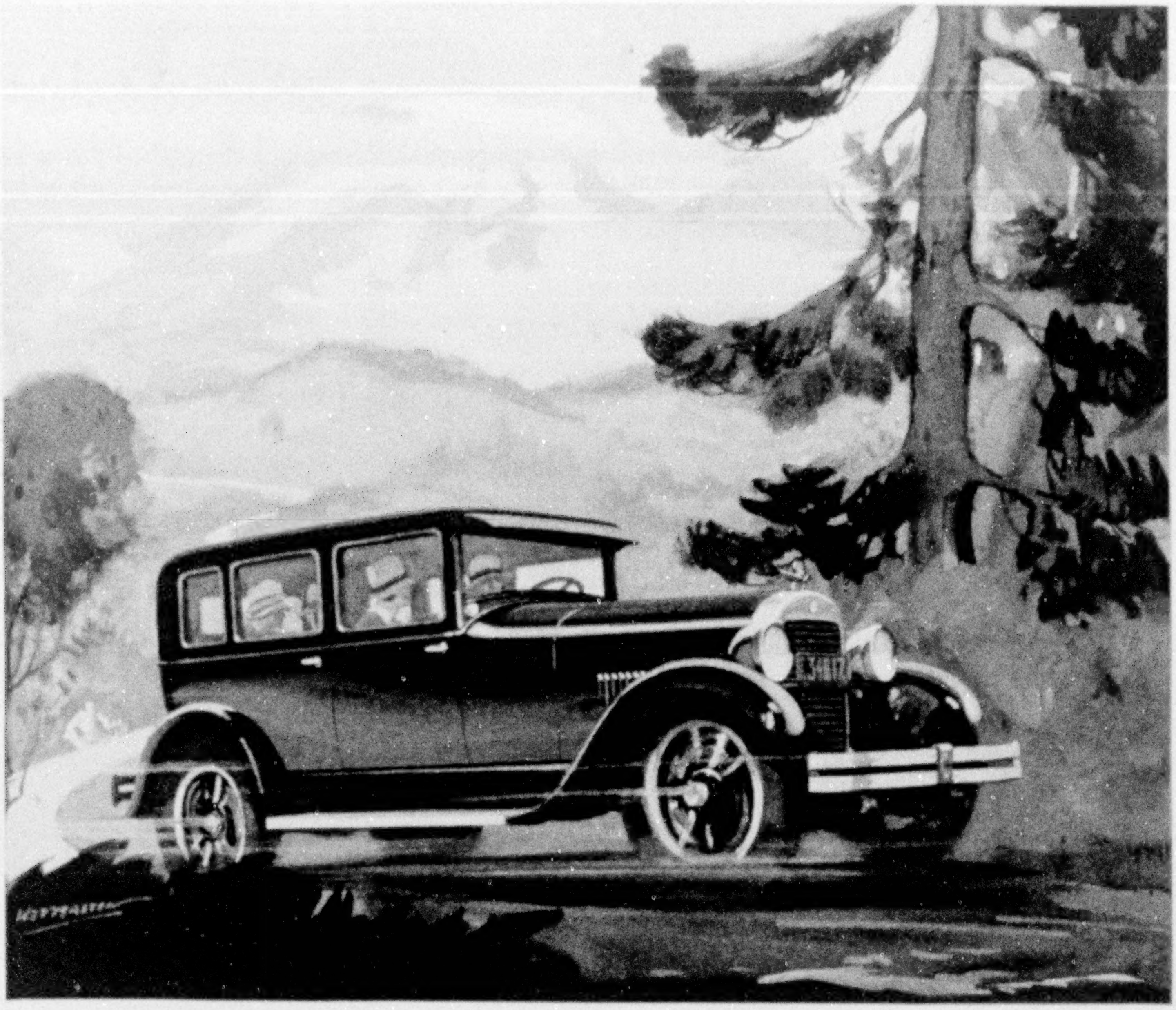

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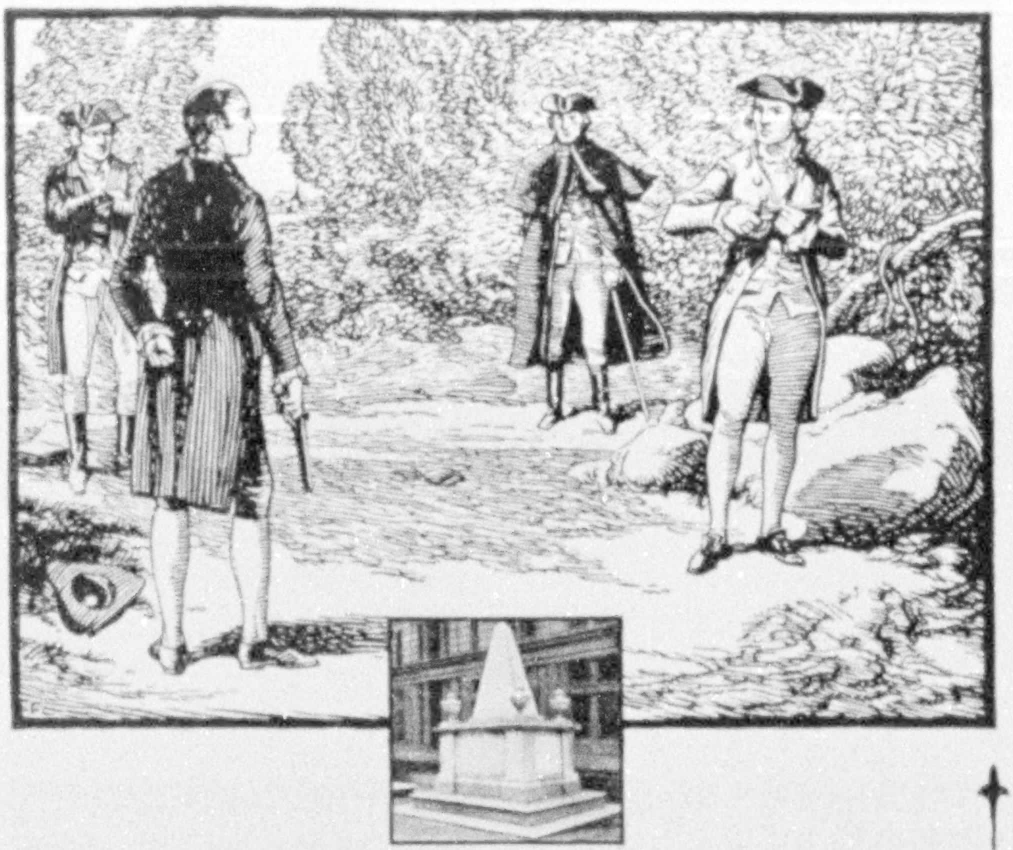

Alexander Hamilton was killed in a duel with Aaron Burr on July 11, 1804. He is buried in Trinity Churchyard, New York.

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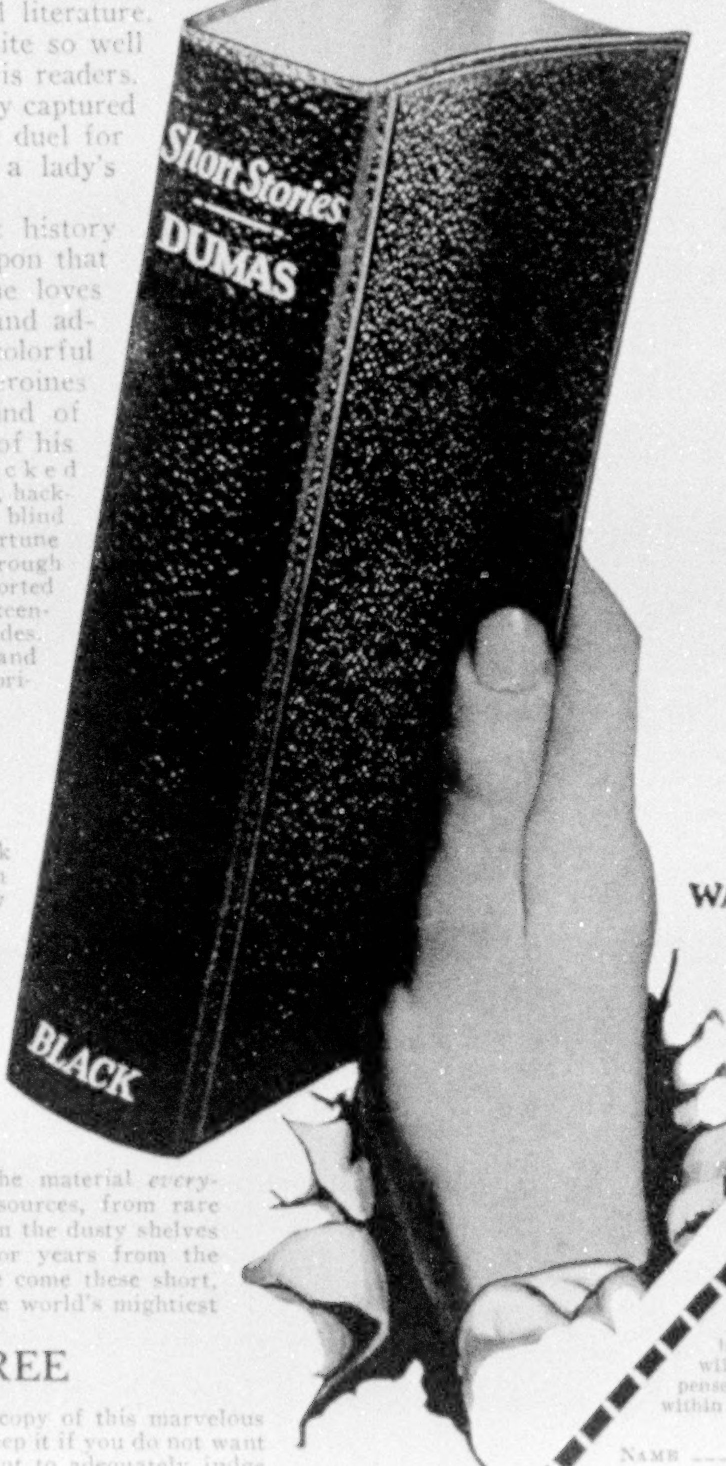

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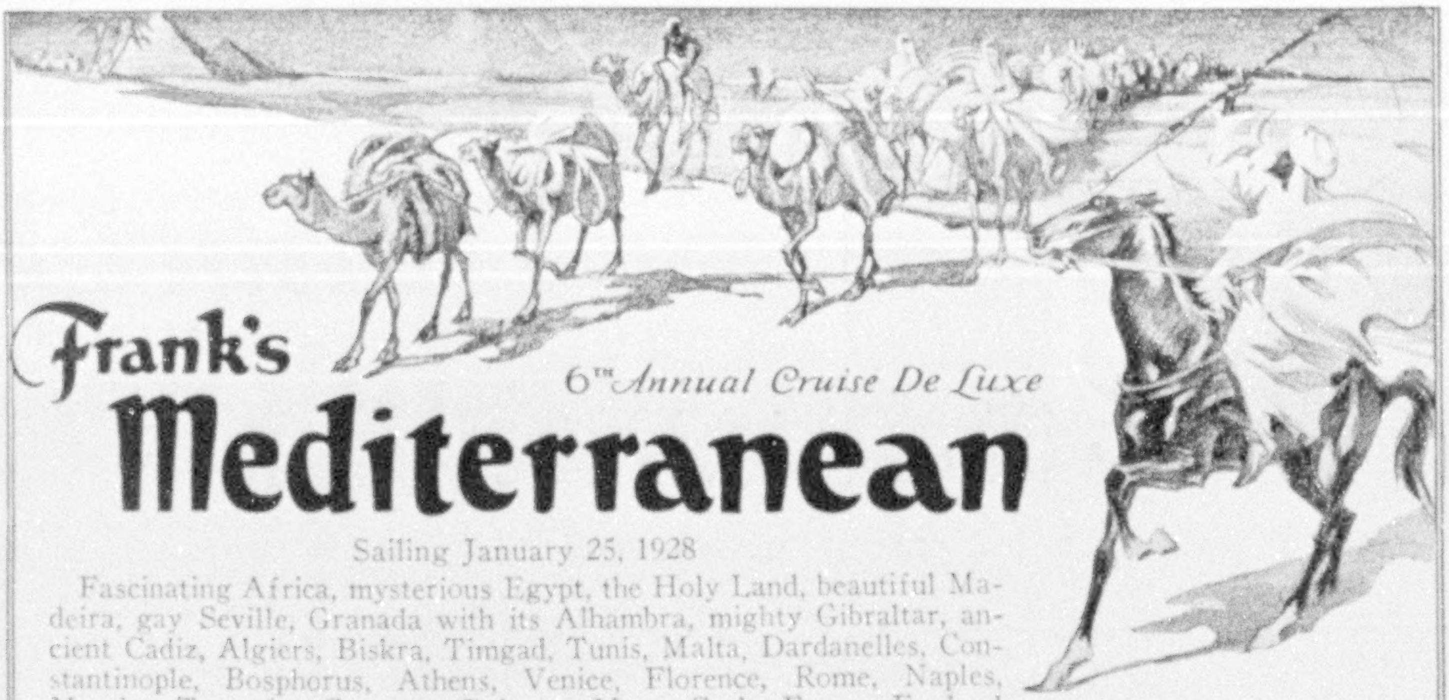

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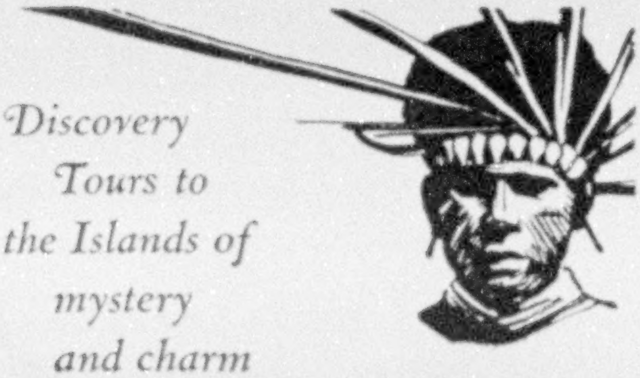

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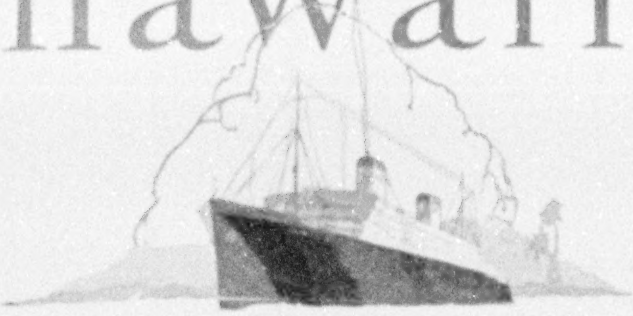

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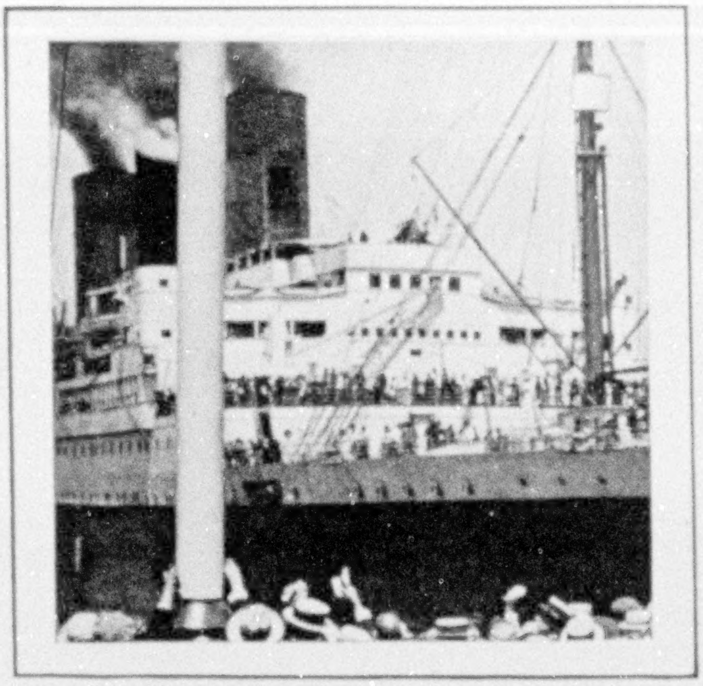

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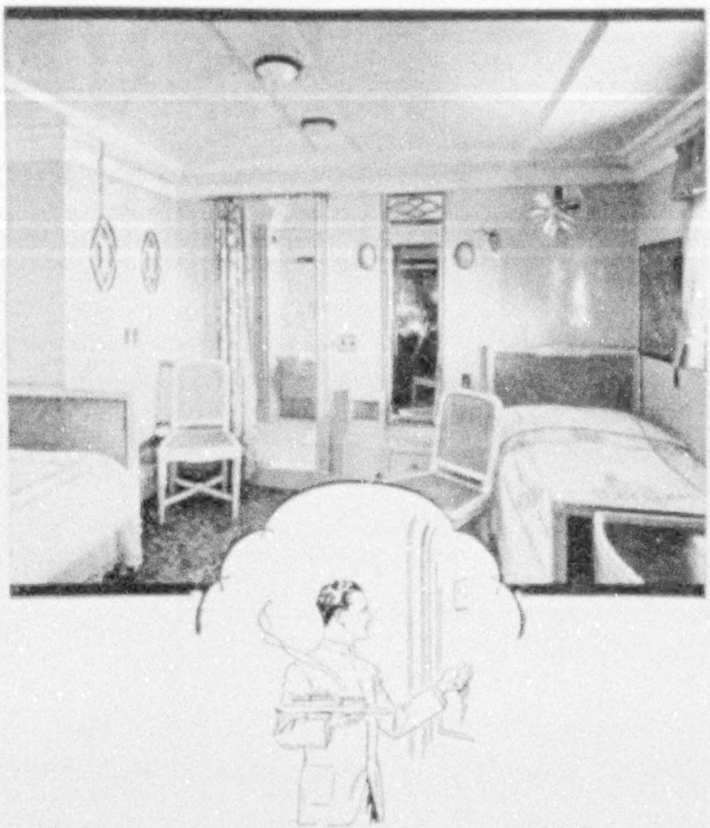

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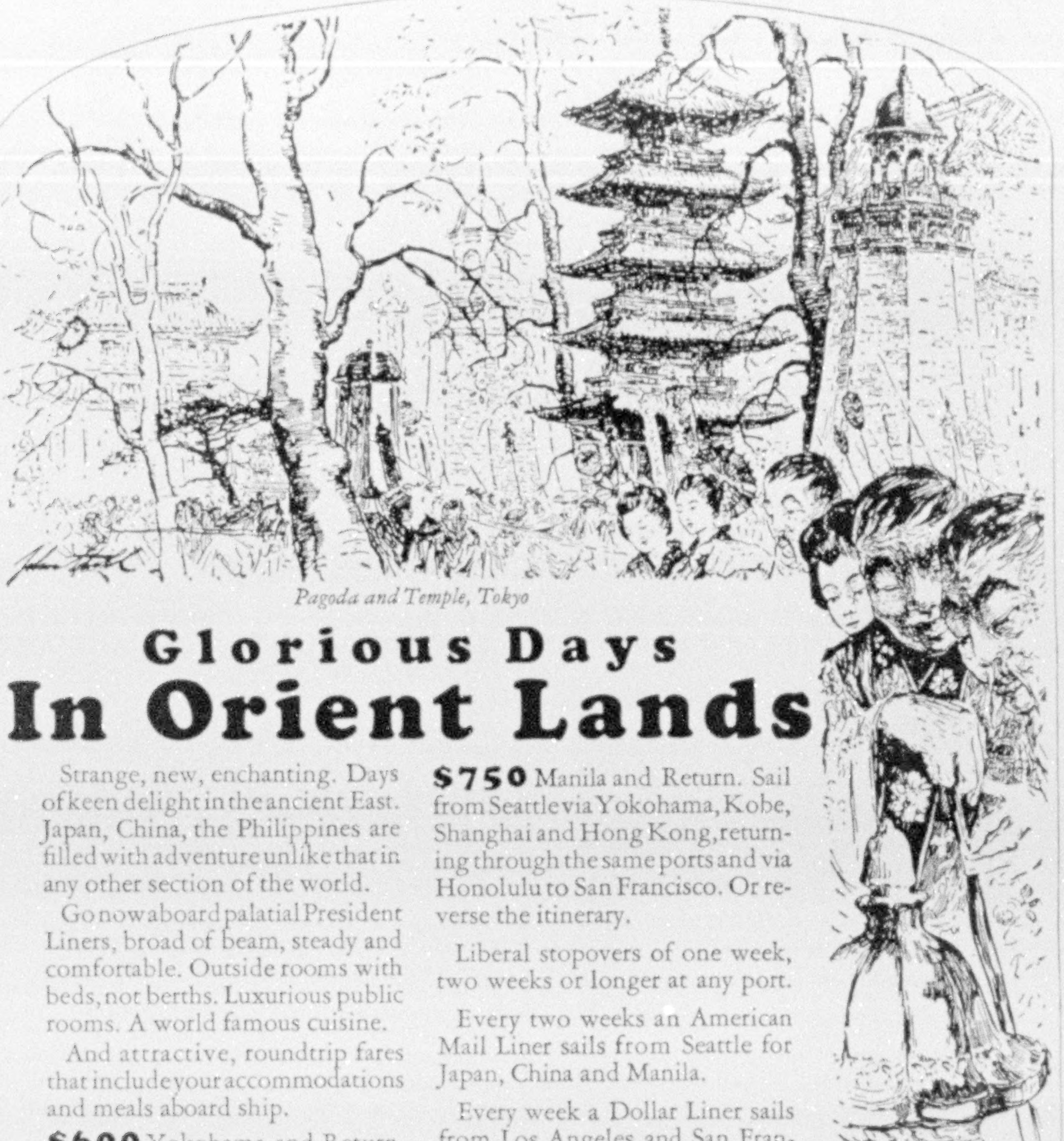

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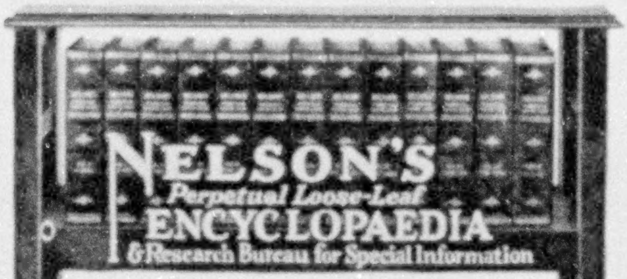

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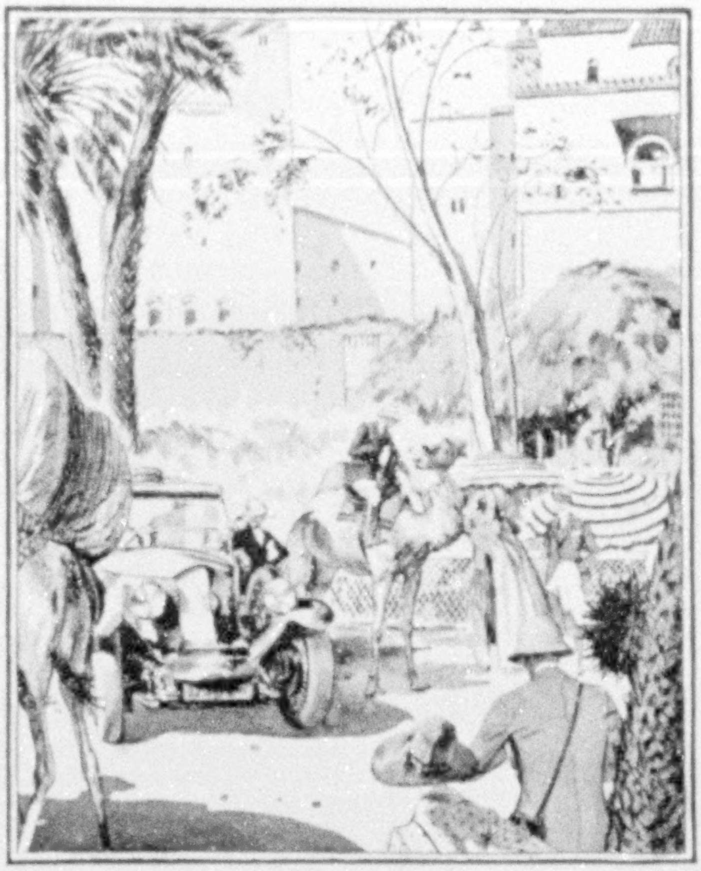

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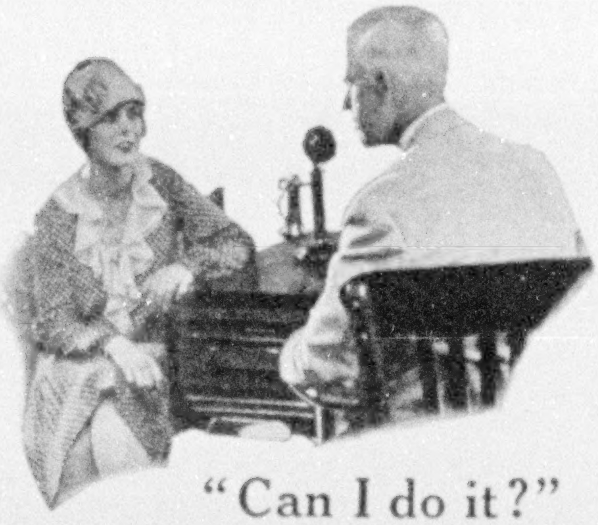

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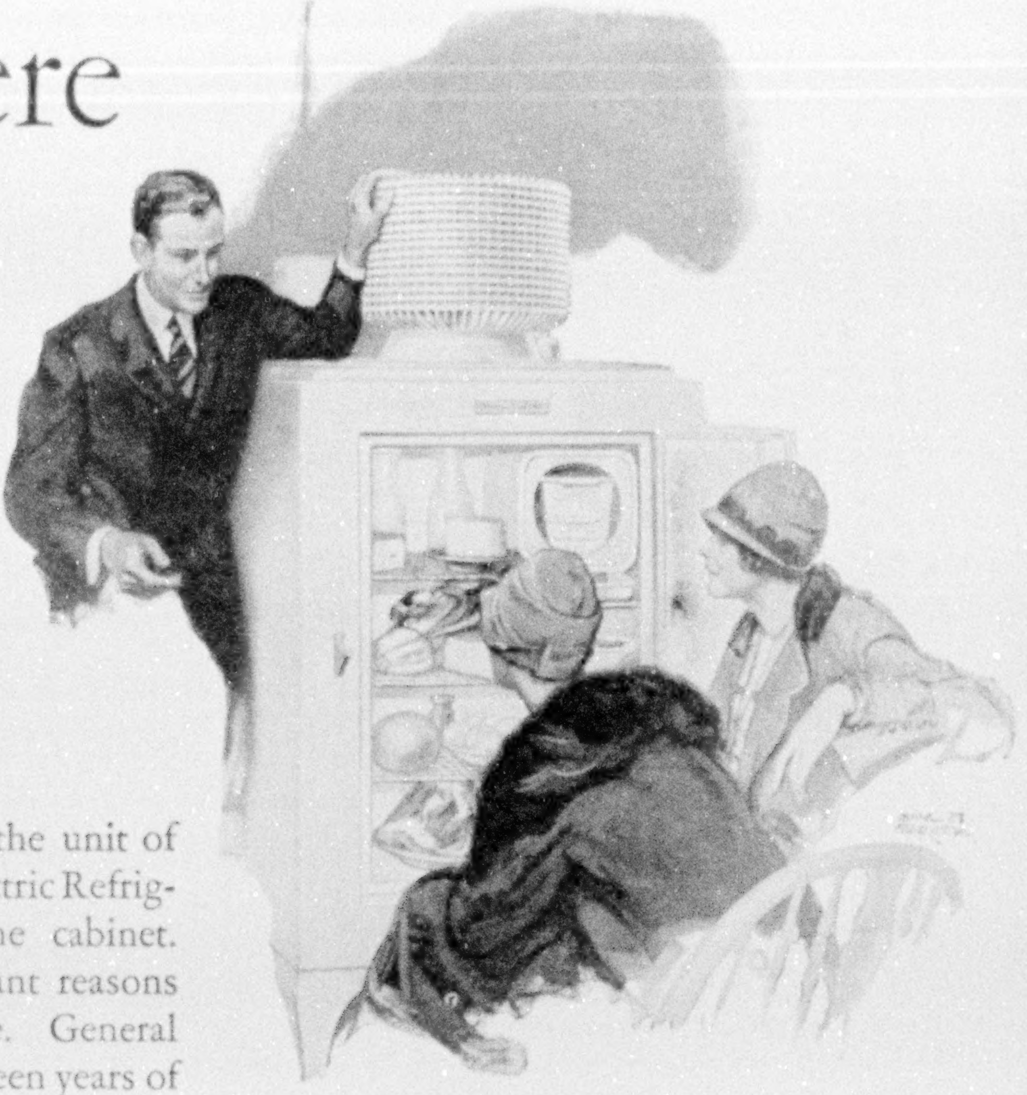

It's all in a single hermetically sealed casing inside these coils . . . there's no machinery underneath, none in the basement

YOU will notice that the unit of the new General Electric Refrigerator is on top of the cabinet. There are many important reasons why it should be there. General Electric engineers, in fifteen years of intensive research, found that the top-unit design was most efficient . . . . and most economical.

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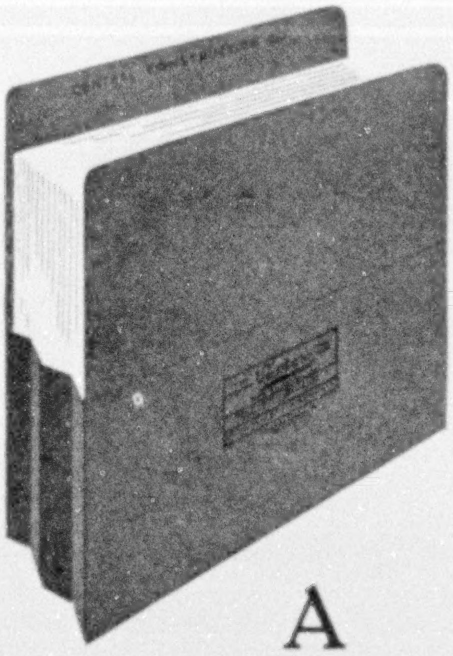

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8th cruise, includes Havana, the Canal, Los Angeles, Hilo, Honolulu, 19 days Japan and China, Manila, Java, Burma, option 17 days India, Ceylon, Egypt, Palestine, Greece, Italy, Riviera, Havre, Glasgow. Europe stop-over.

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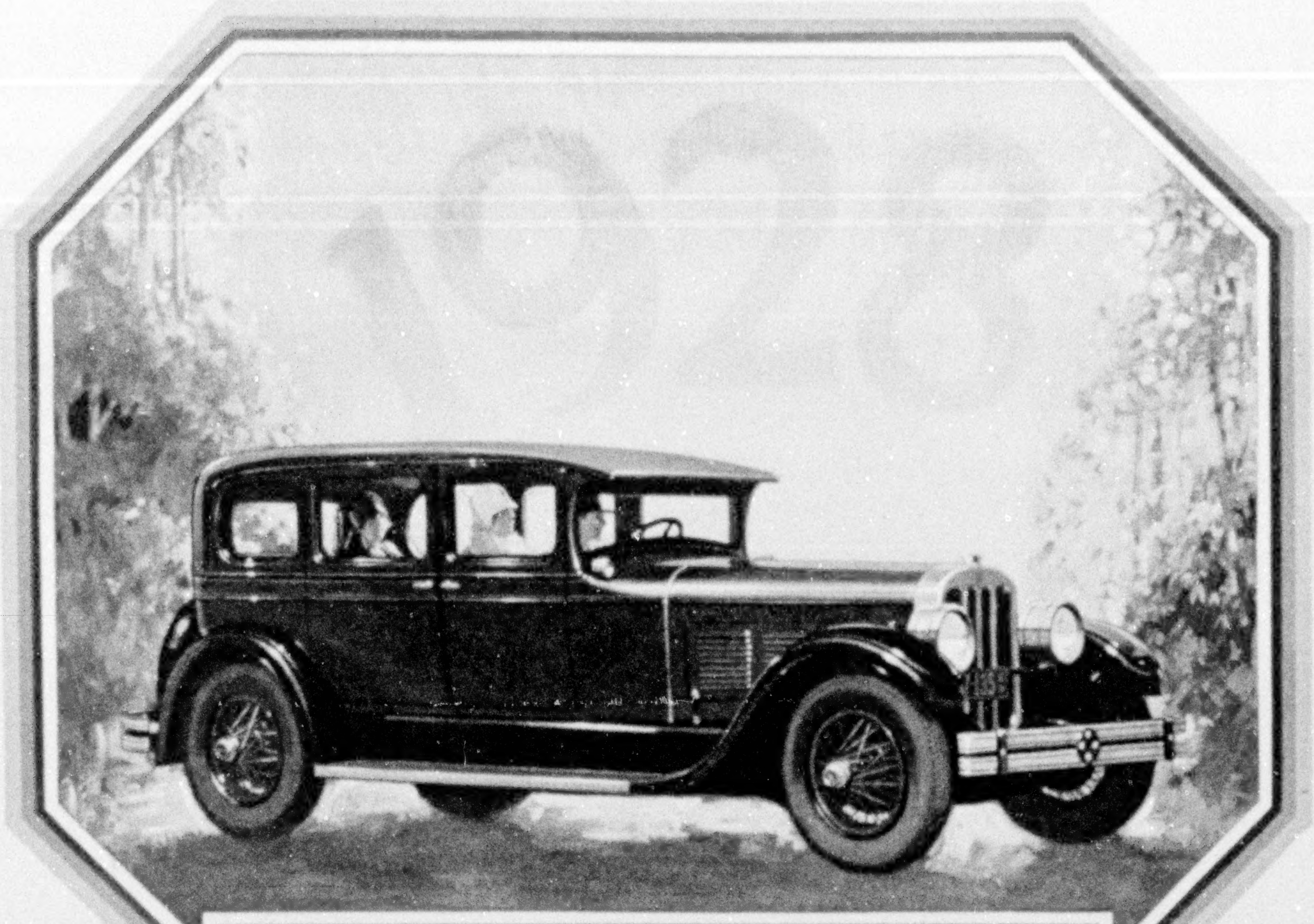

Styled *for the* Boulevards Powered *for* Mountains

THE 1928 Royal Eights and 1928 Sixes by Chandler now give today's dollar a much bigger purchasing power . . . for Chandler is not only giving *more* in excellence but actually asking *less* in money!

These magnificent new cars have impelled a great and rapid surge in Chandler sales—each day gaining in momentum and volume, as more and more people see how much farther Chandler makes the dollar go.

Styled, these new models, as if America's foremost artists and sculptors all got together and worked out the harmony of every line, every curve, every blending of color.

Powered to take the measure of the fastest cars in traffic—to master the steepest hills coolly and calmly, and go gaily on to the next. And what's more, Chandler's famous Pikes Peak motor principle combines with its mighty power a delightful smoothness and quietness.

Cars built, inspected, tested and tested, with the most exacting precision—engineered to give you more mileage than you ever asked of a car—and all you ever do to lubricate a Chandler from end to end, and keep it free from squeaks, is to press a plunger with your foot!

Just see the new Special Six Sedan at $995—and the new Big Six Sedan at $1495—and the new Royal Eight Sedan at $1995—and a score of other new models at similar prices (f. o. b. factory). Just see. Just drive.

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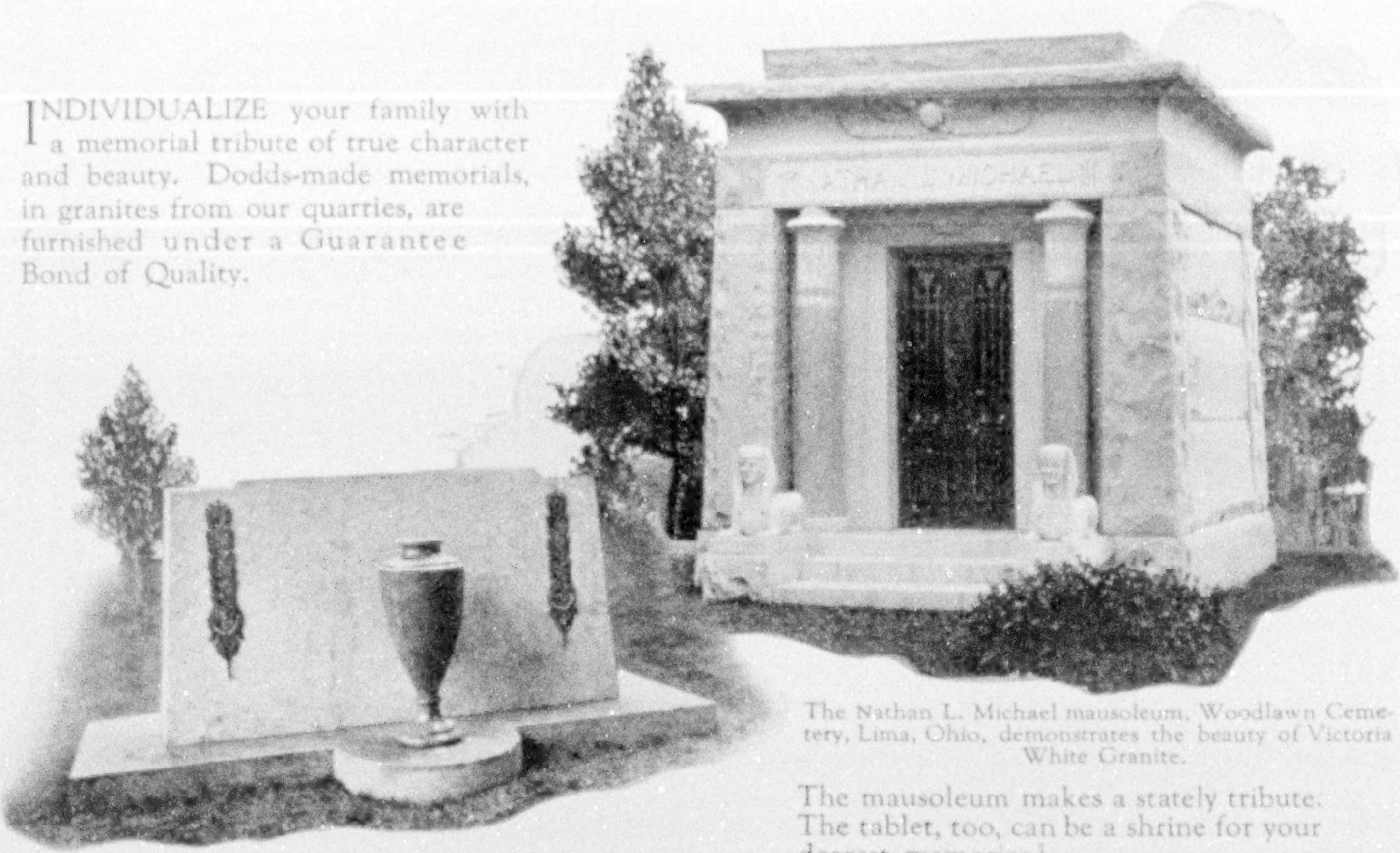

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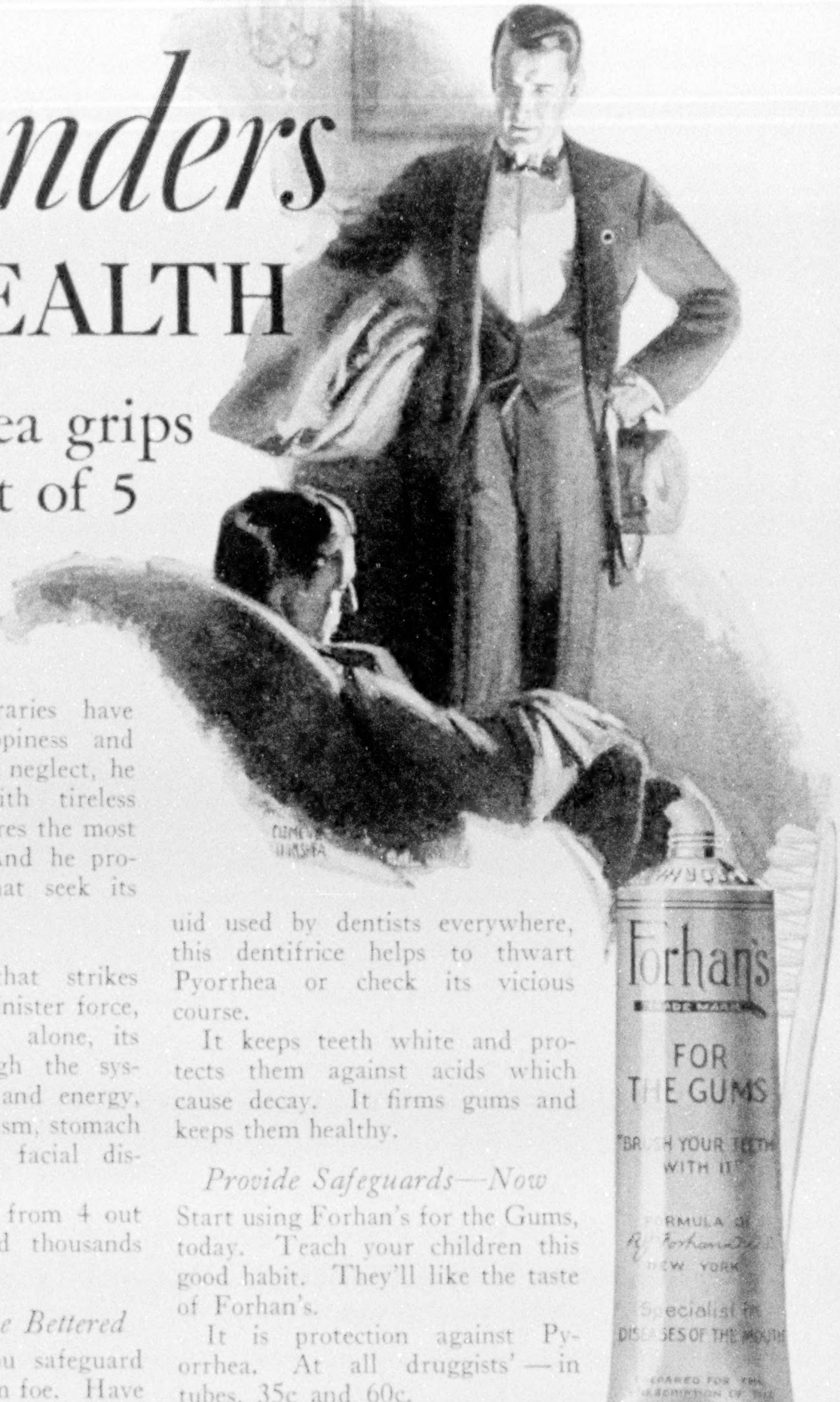
TO *Spenders* *of* HEALTH

Pyorrhea grips 4 out of 5


Forhan's
TRADE MARK
FOR THE GUMS
"BRUSH YOUR TEETH WITH IT"
FORMULA OF
R. J. Forhan D.D.S.
NEW YORK
Specialist in
DISEASES OF THE MOUTH
PREPARED FOR THE PRESCRIPTION OF THE
DENTAL PROFESSION
UNDER AUTHORITY OF
FORHAN CO. INC.
NEW YORK, N.Y. U.S.A.

While his contemporaries have sacrificed health, happiness and success at the altar of neglect, he is still endowed with tireless energy. Of his treasures the most priceless is health. And he protects it from foes that seek its destruction.

* * * *

A ruthless enemy, that strikes unwary victims with sinister force, is Pyorrhea. If let alone, its poison spreads through the system, ravaging health and energy, often causing rheumatism, stomach trouble, anemia and facial disfigurement.

It takes heavy toll from 4 out of 5 after forty and thousands younger.

These Odds Can Be Bettered

A little care and you safeguard health against this grim foe. Have your dentist examine teeth and gums at least twice annually. And start using Forhan's for the Gums, regularly.

Prepared from the formula of R. J. Forhan, D.D.S., for many years a Pyorrhea specialist, and containing Forhan's Pyorrhea Liquid used by dentists everywhere, this dentifrice helps to thwart Pyorrhea or check its vicious course.

It keeps teeth white and protects them against acids which cause decay. It firms gums and keeps them healthy.

Provide Safeguards—Now

Start using Forhan's for the Gums, today. Teach your children this good habit. They'll like the taste of Forhan's.

It is protection against Pyorrhea. At all druggists'—in tubes, 35c and 60c.

Formula of R. J. Forhan, D.D.S.

Forhan Company, New York

Forhan's

FOR THE GUMS

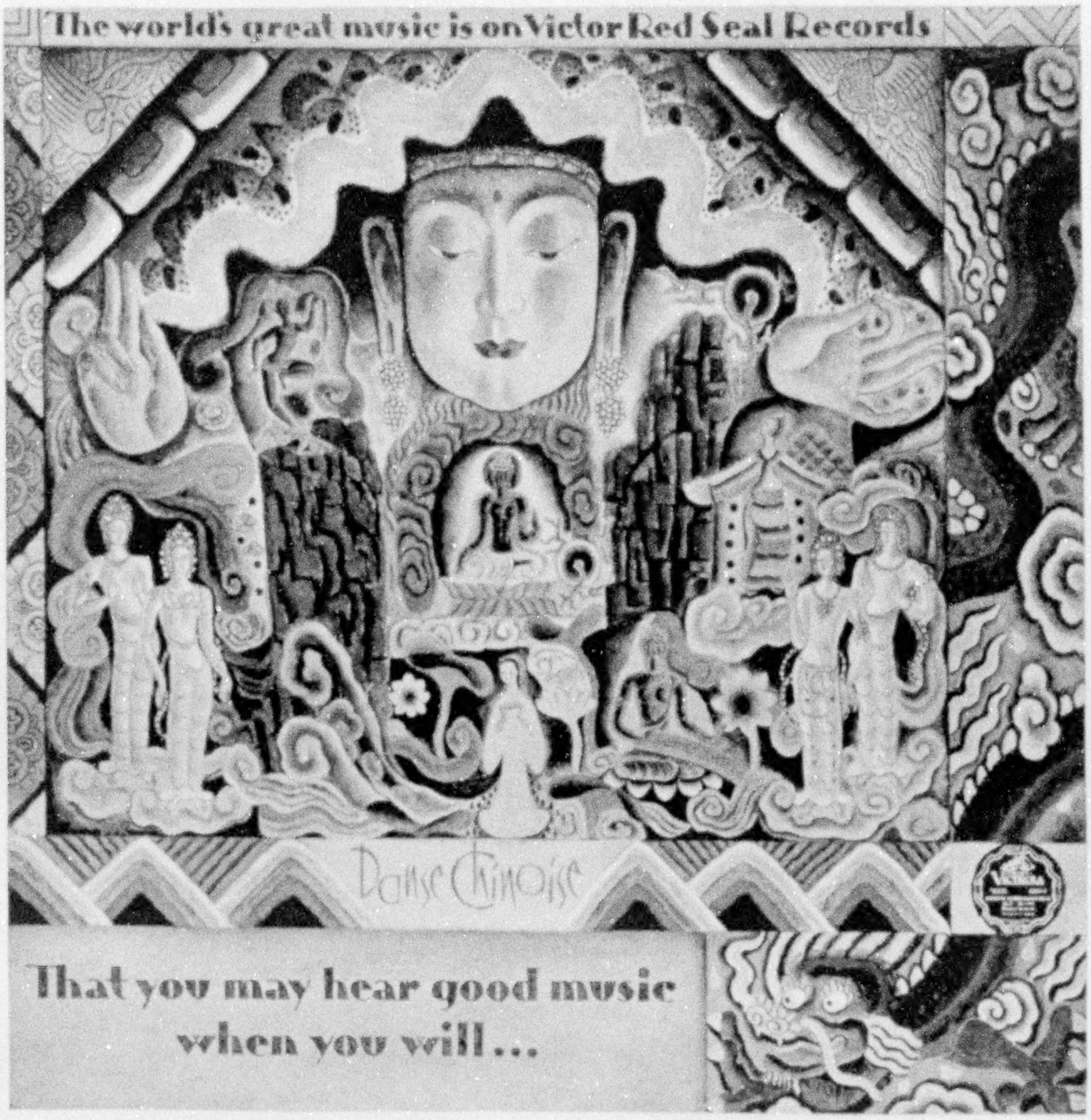
That you may hear good music when you will . . .

MUSIC has colors. It may burn with every hue upon the painter's palette. And in the *Nutcracker Suite,* Tschaikowsky has used them all—the gorgeous golds and scarlets of Pekin; the rich designs of oriental fabrics; shapes, sights and odors as of living flowers; vivid chromatic fantasies from Russia. . . . No music ever written has caught more of the feeling of the designer's art than this extraordinary ballet.

The *Nutcracker Suite* has been recorded in its entirety upon three double-face Red Seal Records (6615-6616-6617) by Leopold Stokowski and the Philadelphia Symphony Orchestra. Their interpretation, already familiar to thousands of concert-goers, is brilliant and imaginative. It should be in every home where good music is known and appreciated. Yet it is only one of many beautiful recordings waiting to delight you.

The world's greatest music, the most eminent artists and orchestras, are yours on Victor Red Seal Records. No matter where you live, they bring into your home the best of the concert platform and the operatic stage. Their music, recorded by the new Orthophonic method, is wonderfully pure in tone, incredibly realistic! . . . *Write today for the illustrated booklet, "A Musical Galaxy," with foreword by Leopold Stokowski—a commentary on six of the greatest moments in music. It is yours for the asking.* Victor Talking Machine Company, Camden, New Jersey, U. S. A.

VICTOR

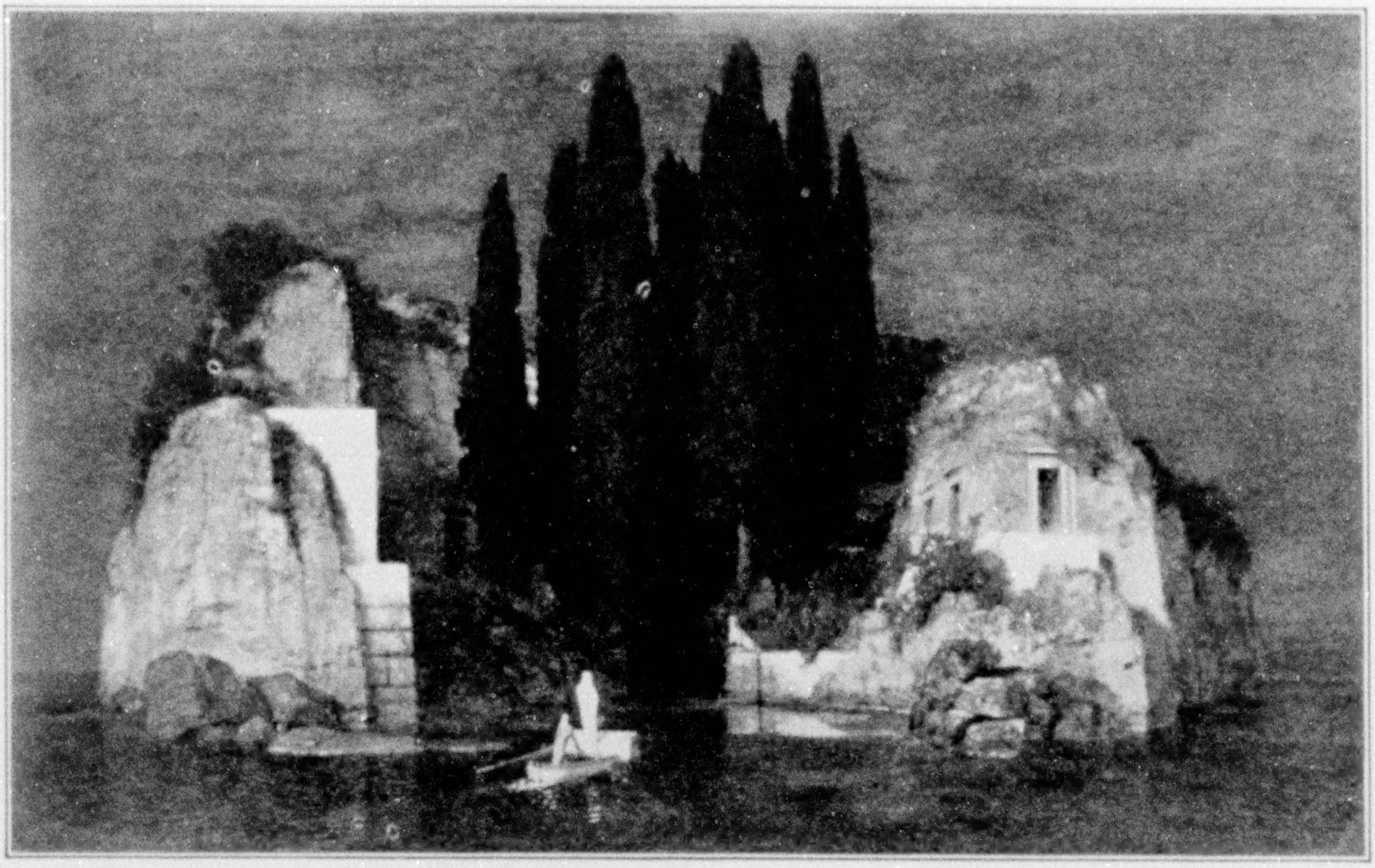

The world's great music is on Victor Red Seal Records
Danse Chinoise
That you may hear good music when you will...

THE above painting, by the distinguished American artist, Eduard Buk Ulreich, is an interpretation of the "Danse Chinoise" from Tschaikowsky's *Nutcracker Suite*. This celebrated ballet, composed to order for the Czar of Russia in 1892, is divided into a number of scenes, each with a separate character and atmosphere—a Chinese dance, an Arab dance, a dance of the mirlitons (represented by the flutes), a Russian dance, a dance of the Sugar-Plum Fairy, and a dainty overture and march.

Red Seal RECORDS

STEINWAY

THE INSTRUMENT OF THE IMMORTALS



ISLE OF THE DEAD *by* ARNOLD BÖCKLIN

Reproduced by courtesy of the Metropolitan Museum of Art, New York City

The dark, macabre beauty of Böcklin's famous painting exerted a powerful influence upon the imagination of Sergei Rachmaninoff. He conceived the idea of a composition which should reflect in music the grandeur, the still and solemn mystery, of Death. His symphonic poem, "Die Toteninsel," *was the result.*

SOONER or later in every cultivated home arises the problem of choosing a piano. . . . Not merely because it is an important element in the well-considered interior. Not only for the prestige which it gives. But chiefly for that joy of actual creation—that thrill of personal relationship with good music—which one feels at the keyboard of a fine instrument.

There is only one piano capable of yielding this experience in its richest and fullest form. The superiority of the Steinway has been recognized for 70 years by the great ones of music, from Wagner to Rachmaninoff. And their choice has been reflected from generation to generation, all over the world, in many thousands of homes. When it is considered that a Steinway will be unfailing in its perfect service 30, 40 and even 50 years or more after purchase, its profound economy becomes apparent. There are many styles and sizes, designed to meet varying conditions of income and acoustics. No music-lover need ever be without a Steinway—or having acquired one, ever buy another. . . . For every Steinway is a musical investment; each holds within itself the assurance of lifelong pleasure and delight.

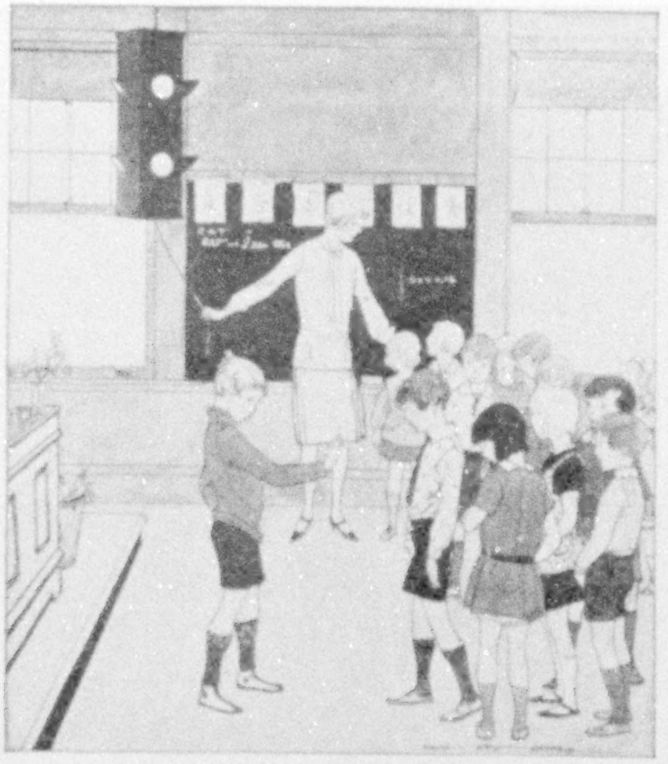
There is a Steinway dealer in your community, or near you, through whom you may purchase a new Steinway piano with a small cash deposit, and the balance will be extended over a period of two years. Used pianos accepted in partial exchange.

Prices: $875 and up

Plus transportation

Steinway & Sons, Steinway Hall
109 West 57th Street, New York

Is Your Town Safe?



© 1927 M. L. I. Co.

These boys and girls are being taught to save their lives! They are learning the meaning of the "Stop" and "Go" traffic signals. In many schools the children make their own semaphores, and the teacher appoints different members of the class to act the part of a Traffic Officer so that the lesson of caution at street crossings can never be forgotten.

EVERY five minutes someone dies from cancer. Every six minutes someone is killed by accident. One death in every 13 is caused by cancer—one in 15 by accident. One—a tragedy foreseen weeks in advance when beyond hope of prevention. The other—swift annihilation that could have been prevented.

Most fatal accidents need never happen; 90,000 a year in the United States—240 a day—deaths from various causes that could be prevented. One-half of the children who are killed are the little untaught ones less than five years old. And accidents claim all too many persons past middle age—who have not adjusted themselves to the swift pace of passing vehicles.

In cities where public caution and protection are taught, the deathrate from accident is far less than the Nation's sad average. Modern scientific Safety Campaigns are organized in these cities. The Mayor, the Police Department, local associations, clubs, societies and citizens of ability and initiative are working together for safety in industry, in the home and on our streets. The newspapers which help to promote Safety Campaigns find a quick response.

No longer has one a right to say, "Accidents are bound to happen. You can't prevent them." Today accident prevention is neither a beautiful dream nor a vain hope. It is a splendid reality. In cities which have said, "It can be done"—it has been done. In some cities the deathrate from accident has been reduced more than half.

Do you know how many people were killed by accident in your town last year? You will find, again and again, that a little forethought or a little more care would have avoided many tragedies. Help to prevent such deaths.

THE LIGHT THAT NEVER FAILS

700,000 Americans seriously injured last year; 23,000 killed by one cause alone—motor vehicle accidents.

Appeals to individual caution have failed to stem the constantly rising tide of accidental deaths. Last year the New York State conference of Mayors decided to conduct an "entire city" Safety Campaign. Albany, N. Y., was selected for the test, and the Metropolitan Life was invited to send safety engineers to co-operate.

A vigorous educational program was undertaken. Every stage of this campaign was carefully mapped out in advance. During the first six months of the demonstration, while practically the entire city supported it, accidental deaths of all kinds were reduced 31%. Fatal accidents to children were reduced 33⅓%. Fatal accidents in homes were reduced 71%.

Based on the results in Albany, the Metropolitan has prepared two booklets, "Promoting Community Safety" and "The Traffic Problem", which outline practical ways and means for accident prevention. Send for two copies of each, one for personal study and one to send to your Mayor. If your town has a working safety organization, support it whole-heartedly. If not, help to establish a local Safety Council.

HALEY FISKE, *President.*

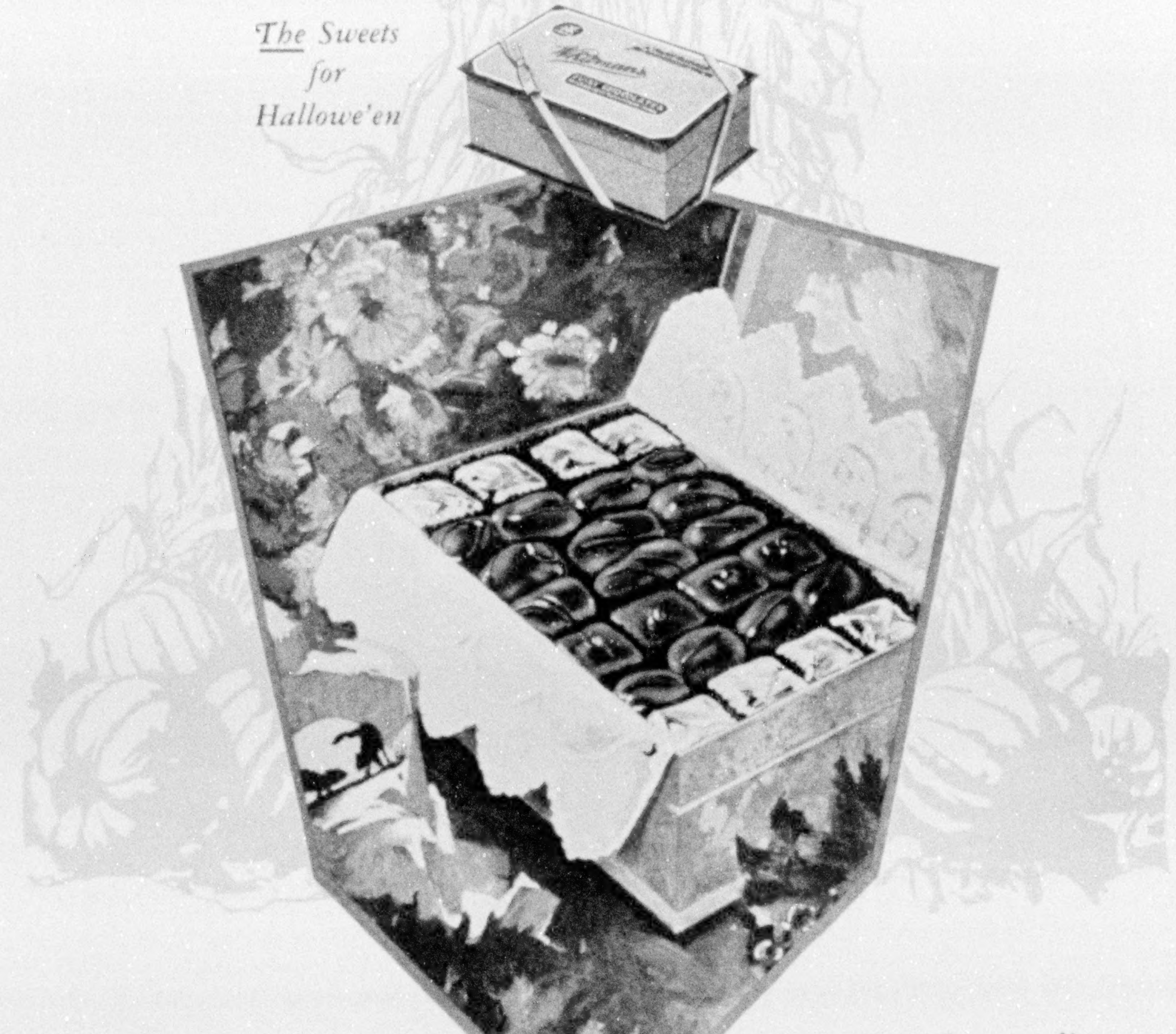
Published by

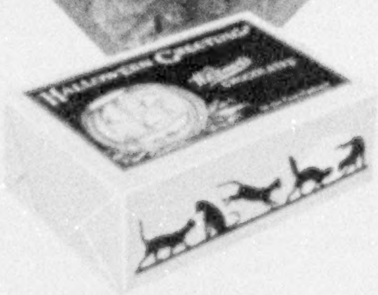
METROPOLITAN LIFE INSURANCE COMPANY—NEW YORK

Biggest in the World, More Assets, More Policyholders, More Insurance in force, More new Insurance each year

On with the Frolic!

Here's a combination of nuts and chocolate that makes for merriment





In the very center of the fun, giving warmth and "pep", is the chosen box of candy. Let us suggest the Fussy Package for the Hallowe'en revels. And, as a most appropriate gift, the Fussy Package in its bright orange and black special gift wrapper. Whitman agencies will mail it to your friends at a distance.

The Fussy Package has a peculiar place in the regard of thousands of candy lovers. It is *their* assortment. Rich chocolate, flavored with real vanilla beans, with centers of nuts and nut combinations. Every piece a firm, or "chewy" chocolate.

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Whitman's Fussy Chocolates

VOL. LII, No. 4 WASHINGTON OCTOBER, 1927

THE
NATIONAL
GEOGRAPHIC
MAGAZINE

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BY COOLIE AND CARAVAN ACROSS CENTRAL ASIA

Narrative of a 7,900-Mile Journey of Exploration and Research Over "the Roof of the World," from the Indian Ocean to the Yellow Sea

By William J. Morden

With Illustrations from Photographs by the Morden-Clark Asiatic Expedition

NORTH of India and Kashmir, across the snowy ranges of the Himalaya and Karakoram, lies a vast area known as central Asia. It is a land of varying characteristics, comprising beautiful mountains, tremendous deserts, and fertile oases. The western part is under Russian domination, but the eastern portion is ruled by the Chinese, who call it "Sinkiang" (the New Dominion).

Sinkiang, or, as it is more generally known, Chinese Turkestan, has for many centuries been the scene of varied migrations, conquests and reconquests. Across it lay the great trade route by which silk was first brought from China to Rome.

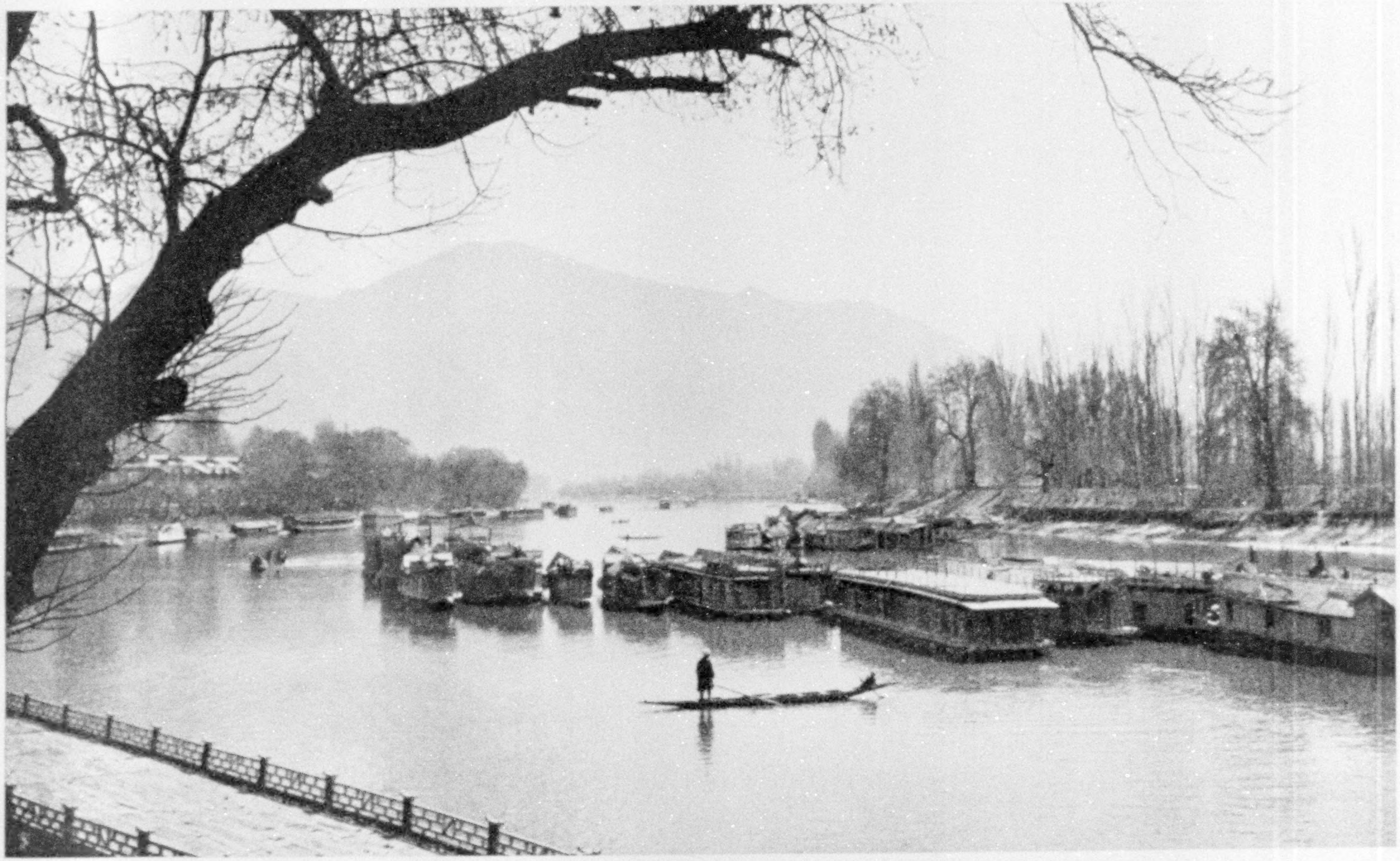
MARCO POLO DISCOVERED THE OVIS POLI

Through its northern part stretches the Tien Shan, the Celestial Mountains of the Chinese. Among the snowy peaks ibex are found, and the forested lower slopes are the homes of wapiti and roe deer. Wild sheep roam the rocky hillsides of the range, and gazelle frequent the barren plains north and south of it.

But it is the Pamir, the high, bleak region of southwestern Chinese Turkestan and southeastern Russian Turkestan, which holds one of the most interesting wild sheep of the world. There range *Ovis poli*, named for Marco Polo, who first brought word of their existence when he returned to Venice, in the thirteenth century, after his wanderings across Asia. Record Ovis poli horns far exceed the measurements of those of any other known sheep. Though they have been shot at various times, no comprehensive single collection had been previously obtained.

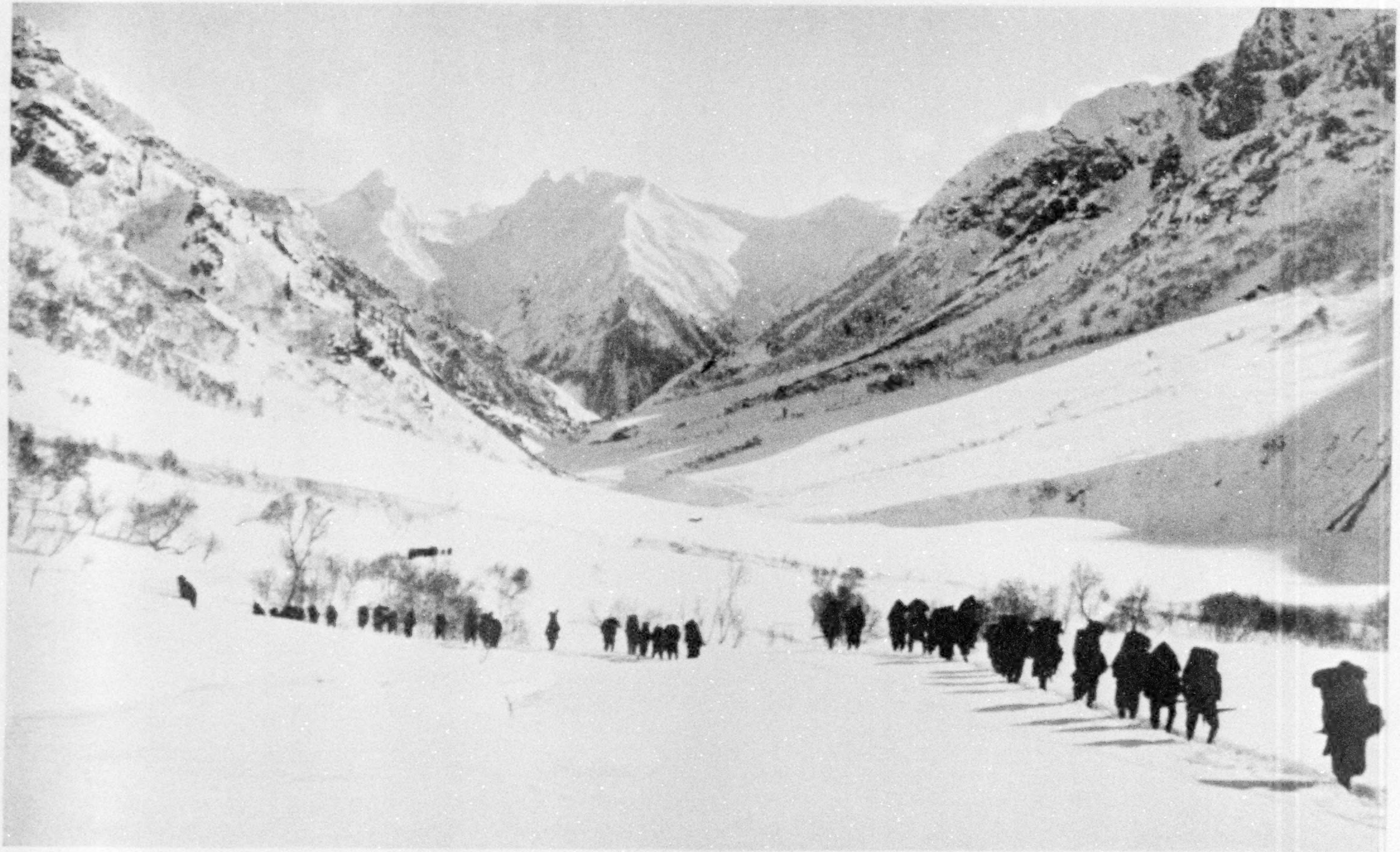
In 1923, while collecting in the Himalaya of Baltistan and Ladakh, I made inquiries regarding the possibility of a future expedition into the Pamir. All information was that Ovis poli were very scarce. Reports indicated that there had been an epidemic of some disease which had so reduced the number of these sheep that there seemed little chance for a successful expedition.

I noted, however, that all these reports came from Chinese Turkestan, and that none indicated what conditions might be were an expedition able to operate on the Russian side. The idea occurred to me that it might be possible to find these sheep in greater numbers if permits to hunt there could be obtained.



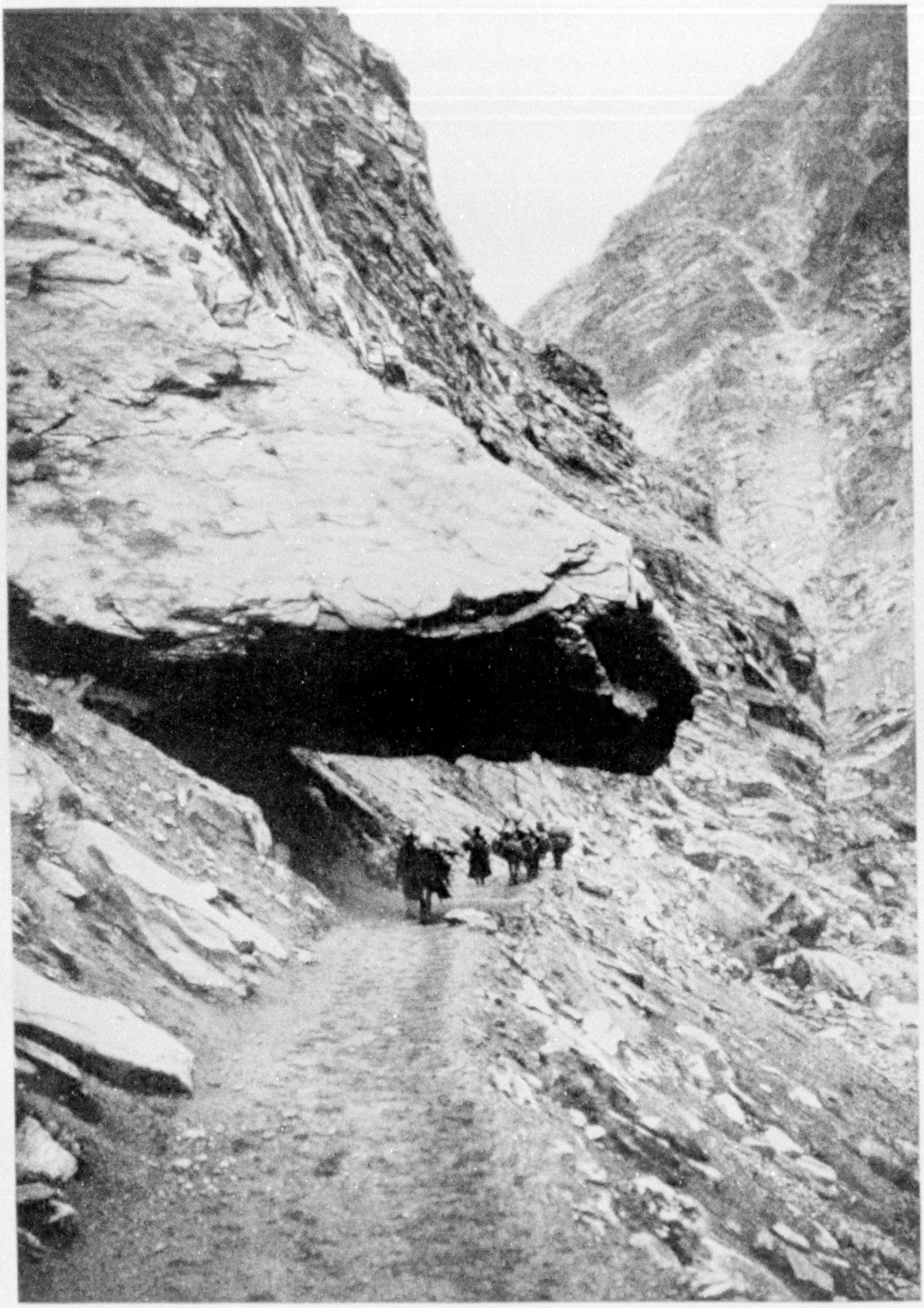
HOUSEBOATS ARE NUMEROUS AND POPULAR IN SRINAGAR

Foreigners cannot own land in Kashmir, and as a result there has grown up a widespread custom of using houseboats for residential purposes. The Jhelum River, myriad canals, and lovely lakes offer ideal "home sites" for summer use. Many permanent residents of Srinagar own their boats, but visitors rent them from native proprietors.



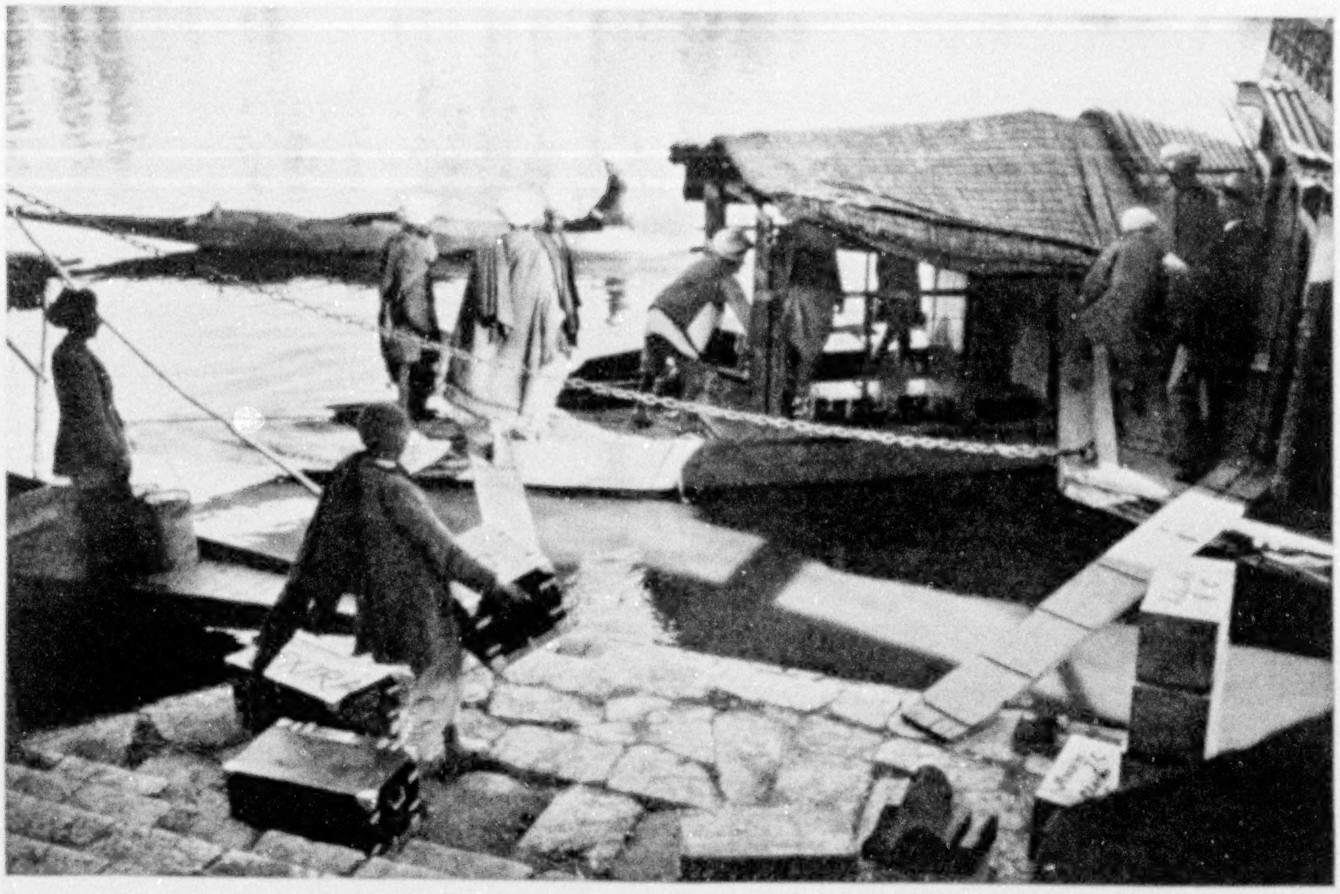
THE BURZIL PASS OFFERS TREACHEROUS GOING IN EARLY SPRING

Carrying a road through the Burzil Pass was one of many engineering achievements of India. The work was done at an altitude of more than 13,000 feet, in the face of blizzards and avalanches. The author's expedition was the first to cross the pass in 1926, and was nearly a month earlier than the first party in 1925. Although this valley appears open and easy, it is dangerous in March and April because of frequent landslides.



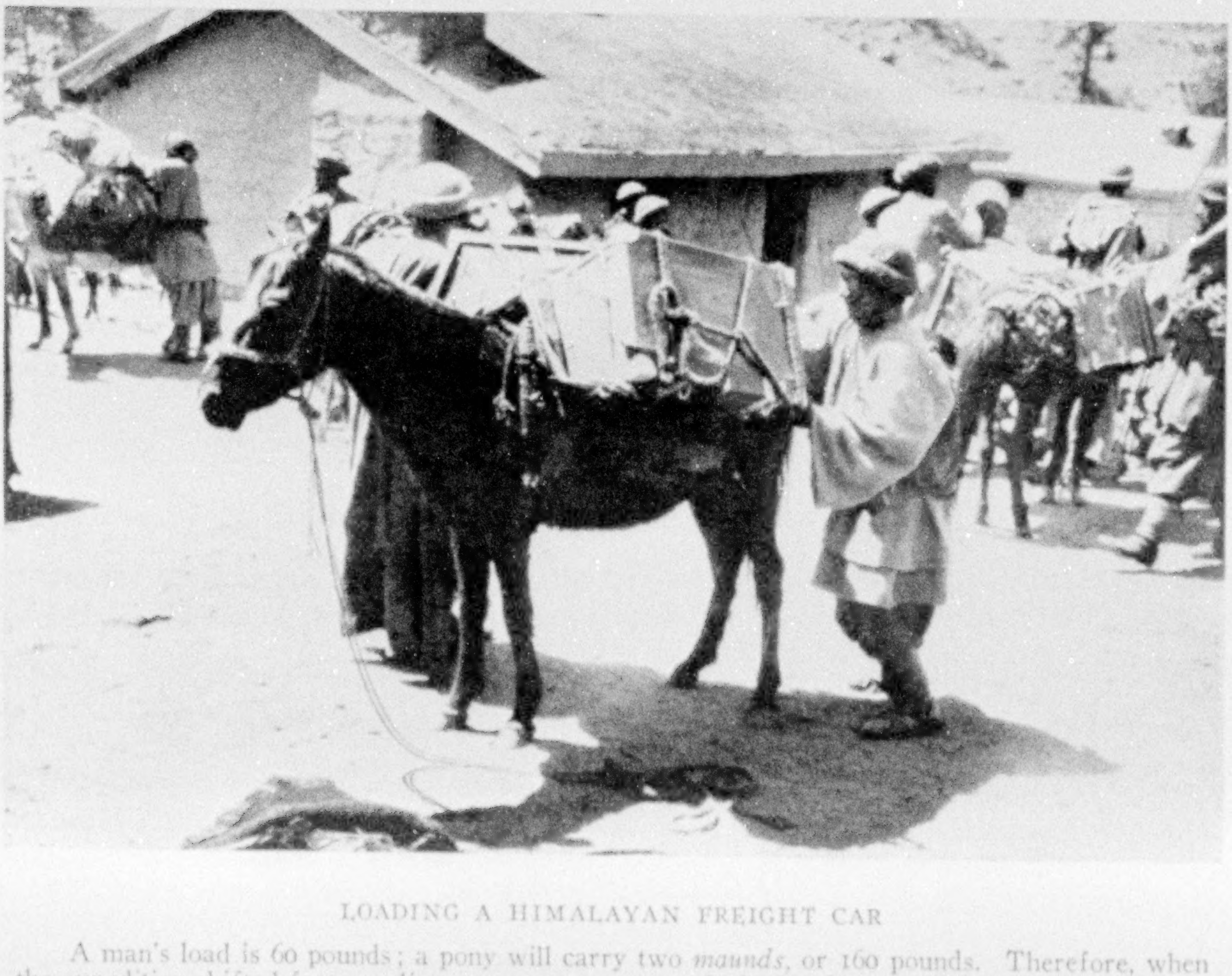
A ROAD THAT KNOWS NO WHEELS

No wheeled vehicle has ever succeeded in traversing the winding trail known as the "Road to Gilgit." So precipitous is this trail that food for the small Kashmiri garrison at Gilgit has to be packed by coolies (see, also, text, page 375).



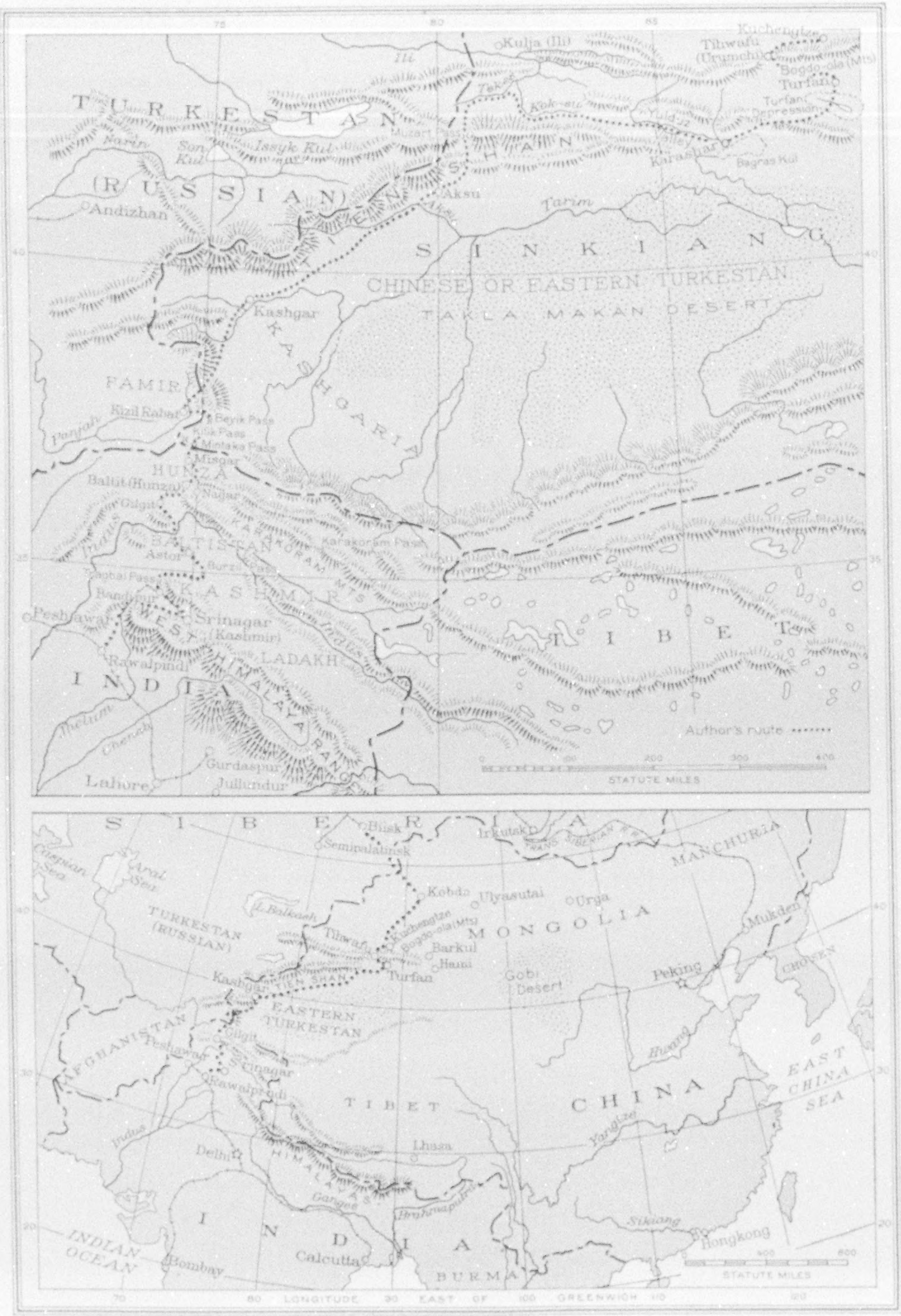
PACKING THE EXPEDITION'S BOXES ON A "DUNGA" AT SRINAGAR

A *dunga* is a small Kashmiri houseboat with sides and roof of matting. The author's expedition used one for the first stage of its journey (see text, page 375).



LOADING A HIMALAYAN FREIGHT CAR

A man's load is 60 pounds; a pony will carry two *maunds*, or 160 pounds. Therefore, when the expedition shifted from coolie to pony transport, packs had to be remade into 80-pound units; and when coolies were required again the packing process was reversed (see text, page 376).


TURKESTAN
(RUSSIAN)
Ili
Kulja (Ili)
Kuchengtze
Tihwafu (Urumchi)
Bogdo-ola (Mts)
Turfan
Turfan Depression
Tekes
Kok-su
Yulduz Valley
Karashar
Bagras Kul
Narin
Son Kul
Issyk Kul
Muzart Pass
TIEN SHAN
Aksu
Tarim
Andizhan
SINKIANG
CHINESE OR EASTERN TURKESTAN
TAKLA MAKAN DESERT
Kashgar
KASHGARIA
PAMIR
Kizil Rabat
Panjah
Beyik Pass
Kilik Pass
Mintaka Pass
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Nagar
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BALTISTAN
KARAKORAM MTS
Karakoram Pass
Astor
Burzil Pass
Tragbal Pass
Bandipur
KASHMIR
Peshawar
WEST
Srinagar (Kashmir)
Rawalpindi
LADAKH
INDIA
HIMALAYA RANGE
Jhelum
Chenab
Gurdaspur
Jullundur
Lahore
TIBET
Author's route
STATUTE MILES
0 100 200 300 400
75 80 85
40 35
SIBERIA
Biisk
Irkutsk
TRANS-SIBERIAN RY.
Semipalatinsk
Caspian Sea
Aral Sea
L. Balkash
Kobdo
Ulyasutai
Urga
MANCHURIA
TURKESTAN (RUSSIAN)
Tihwafu
Kuchengtze
Bogdo-ola (Mts)
MONGOLIA
Barkul
Hami
Mukden
Kashgar
TIEN SHAN
Turfan
Gobi Desert
Peking
CHOSEN
EASTERN TURKESTAN
Gilgit
AFGHANISTAN
Peshawar
Srinagar
Rawalpindi
Hwang
TIBET
CHINA
EAST CHINA SEA
Indus
Yangtze
Lhasa
Delhi
HIMALAYAS
Ganges
Brahmaputra
Sikiang
Hongkong
INDIA
INDIAN OCEAN
Bombay
Calcutta
BURMA
STATUTE MILES
400 800
40 30 20
70 80 LONGITUDE 90 EAST OF 100 GREENWICH 110 120

Drawn by A. H. Bumstead

A SKETCH MAP OF CENTRAL ASIA, SHOWING THE ROUTE OF THE MORDEN-CLARK ASIATIC EXPEDITION

Inasmuch as the Russian Pamir is military territory and ordinarily forbidden to outsiders, considerable preliminary work was necessary to obtain permits. It was also difficult to get one from the Government of India, allowing the use of the direct route, through Gilgit and Hunza, from Kashmir to Sinkiang. Chinese passports and arms permits were also necessary, and these had to come directly from Peking. All this took much time, so that it was not until the autumn of 1925 that definite plans for an expedition could be made.

THE PAMIR EXPEDITION GETS UNDER WAY

In talking with Dr. Roy Chapman Andrews, leader of the Central Asiatic Expeditions of the American Museum of Natural History in New York, a meeting was planned between one or two motor cars of his expedition and my own party. The point selected was the small town of Hami, in eastern Turkestan; the date set was September 1, 1926. Since his expedition expected to be working in western Mongolia, and as I, by the latter part of the summer, planned to have traveled north to the Tien Shan, we would, in that case, be within approximately 1,000 miles of each other, and a quick dash upon the part of each would enable us to make contact at Hami (see map, page 374).

Dr. Henry Fairfield Osborn, President of the American Museum of Natural History, detached Mr. James L. Clark, Assistant Director of the Museum, in charge of the Department of Preparation, to accompany me. No better man could have been assigned, as Mr. Clark was particularly fitted by training and experience for the sort of work contemplated.

Officially known as the Morden-Clark Asiatic Expedition of the American Museum of Natural History, we left New York in January, 1926, making short stops in London and Paris to outfit and obtain additional credentials. In March we arrived in Bombay, and after a day's stop at Delhi, left the railroad at Rawalpindi. Motor transport took us the 190 miles to Srinagar, the lovely old capital city of Kashmir (see, also, page 370).

The Government of India gave every assistance, but requested that transport be limited to a maximum of 60 coolies, the sparse population of Gilgit and Hunza making it impossible for local authorities to furnish a greater number. Supplies of food and equipment had to be packed in loads of not more than 60 pounds, and when this was done, there were more than the number of loads allowed. We did not wish to leave behind film and other necessary equipment, so discarded six loads of food, hoping to replenish stores at one of the cities in Turkestan.

The passes from Kashmir were not officially open until May 15, but it was necessary to start six weeks earlier, in order to reach the Pamir before the Ovis poli had begun to shed their winter coats. Once they begin to shed, they are useless as museum specimens until late autumn, when their new coats have grown.

We were told that it would be impossible to take our kit across the passes for at least a month, but necessity forced us to start, in spite of this advice.

Assisted by British officials in Kashmir and the obliging manager of the Coburn agency, who engaged our staff of Kashmiris and assisted with the packing of supplies, we left Srinagar on March 30.

The first stage was made in two small houseboats on the Jhelum River, which winds its placid way through the ever-beautiful Vale of Kashmir. From Bandipur the road to Gilgit starts into the mountains, and there our first coolies were engaged. Coolies are hired for from one to three stages, each stage covering from 10 to 15 miles.

NO WHEELED VEHICLES TRAVEL THE GILGIT ROAD

Though called the "Gilgit Road," no wheeled vehicle has ever traversed the winding trail over which all supplies for the small Kashmir garrison in Gilgit must be packed in summer. Since the passes were not officially open for travelers, arrangements with the coolies were made direct. Though we were told they would need much persuasion to attempt the crossing of the passes, we found the greatest difficulty was to pick the required 60 from a crowd of fully 150 men who presented themselves.

Coolie transport was necessary for at

least a week, as ponies cannot be used on the passes until much snow has disappeared.

After considerable shouting and argument on the part of our Kashmiri staff, loads were finally sorted and a start made on April 1. The Tragbal and Burzil passes are easy during summer. But early in the season, when snow still lies deep on the pony trails, the march is difficult.

For traveling on snow and rock Europeans and natives use Kashmiri grass shoes, ingenious sandallike footgear made of twisted rice straw. Natives often wear them over bare feet, but less hardened travelers first put on a pair of specially made light woolen socks, then a pair of quilted woolen shoes. Both have the big toes separated from the others and two strands of the grass rope pass between them (see page 377).

After the foreigner's feet become used to them, grass shoes are an aid when walking in snow and over rocky country.

From Bandipur the winter trail leads up to Tragbal resthouse, a climb of 4,000 feet in 12 miles; then over the Tragbal Pass, 11,560 feet, and on down to the foot of the Burzil Pass. At each stage along the Gilgit route the Kashmir Government has built small resthouses. Here one may have fire and find rest after the day's hard work.

We had good weather for crossing the Tragbal, but for several stages afterward it snowed, rained, or sleeted almost continually.

AVALANCHES MENACE TRAVELERS

Avalanches are the greatest dangers which travelers in the Himalaya face in the early season. Winter snows pile deeply on the mountains above the passes, and, when warmed by the sun, great masses of snow and ice rush downward across valleys, sweeping away everything in their path. Whole caravans of coolies have been engulfed, and the mail carriers, or *dak* runners, are in constant peril.

In order to avoid this danger as much as possible, one must start very early in the morning, traveling as rapidly as possible before the sun's warmth has loosened the snowslides. We did not encounter any new avalanches, but crossed many old ones.

The distance to the resthouse at the foot of Burzil Pass was only 11 miles. Nevertheless, it was a long, hard march, as the snow was deep and soft and the grade constantly increased. All our coolies arrived by mid-afternoon, although one or two suffered from mountain sickness for a time.

TOES WERE FROZEN AND FACES WERE SUNBURNED

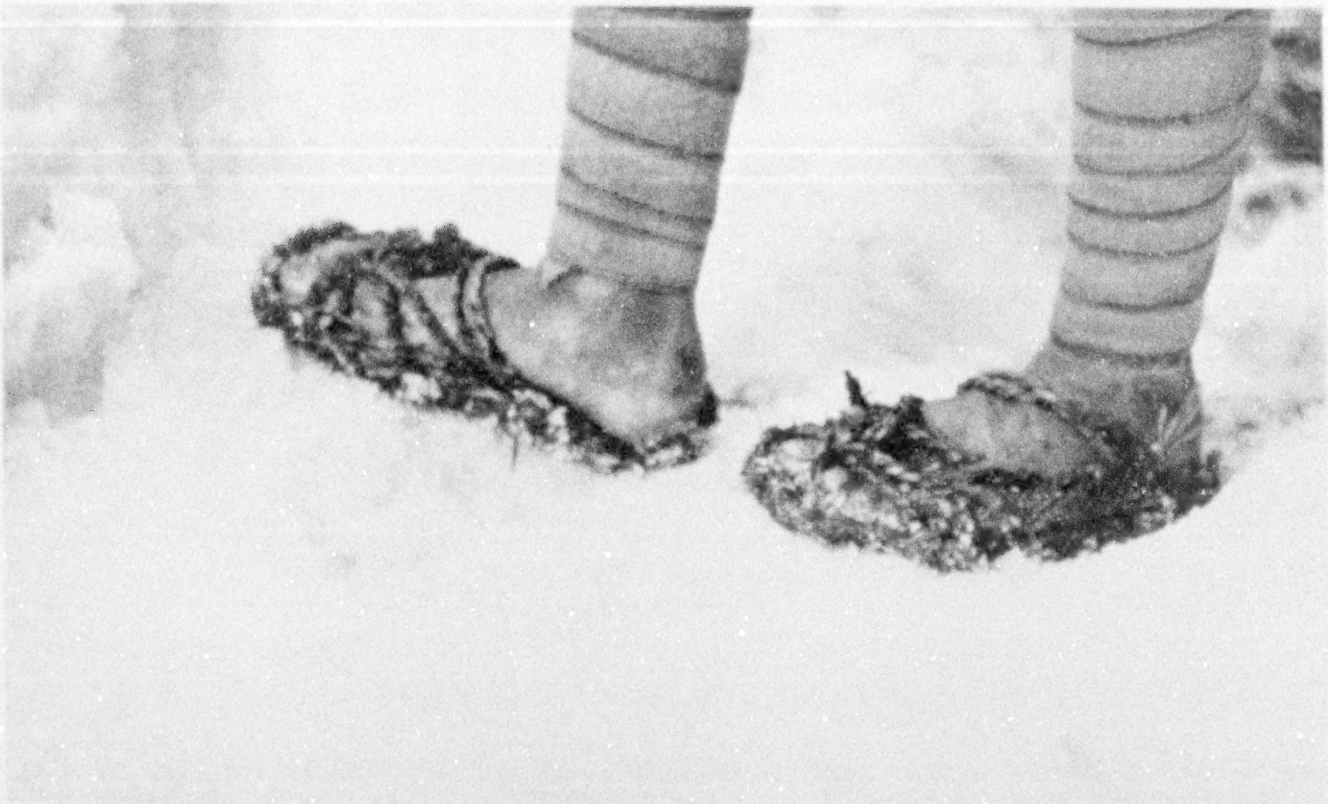
We were now ready for the great effort of the Burzil. At 2 in the morning, after some difficulty in persuading the coolies to carry on, a start was made by lantern light up to the pass, a narrow valley between steep-sided mountains. Owing to stormy weather, dak runners had not crossed for a week and much new snow had drifted deeply across the path, forcing our party to break trail continually. The struggle upward against a biting wind amid deep drifts made this labor so great that we were forced to take turns at it (see illustration, page 371).

The sun came up as we reached the summit, 13,775 feet, where a tiny refuge hut offered shelter from sudden storms. Though it had been bitterly cold when we started—so cold, in fact, that Clark froze two toes—after sunrise the glare from smooth expanses of snow necessitated sun glasses and burned our faces until we were forced to tie handkerchiefs over them.

The snow was deeper on the northern descent, and it was slow work plunging through drifts which were at times waist-high. Partway down we met the upcoming mail carriers. They wore crude native snowshoes, consisting of light oval frames of wood across which flat pieces had been fastened. On top of these they used the ordinary grass shoe.

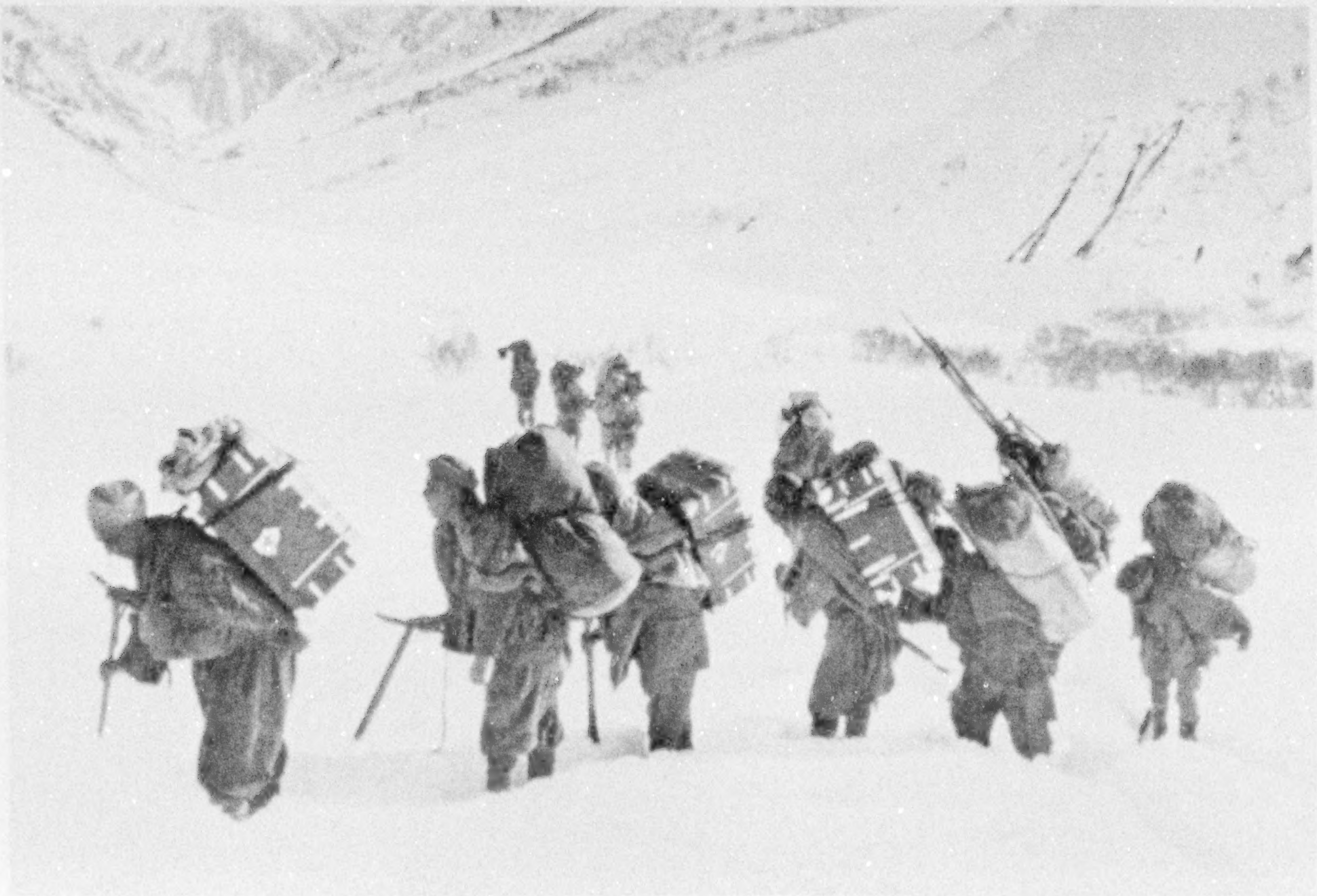
Ten miles from the foot of the pass, we heard that two coolies were exhausted, so we sent two men back to where our long file was slowly working downward, each native walking in the footsteps of the leader. The men who had fallen by the wayside, however, gamely came on to the resthouse with their loads.

Twelve more miles brought us to a village where ponies had been sent to meet us. There we paid off the coolies and transferred their loads to *tats,* as the



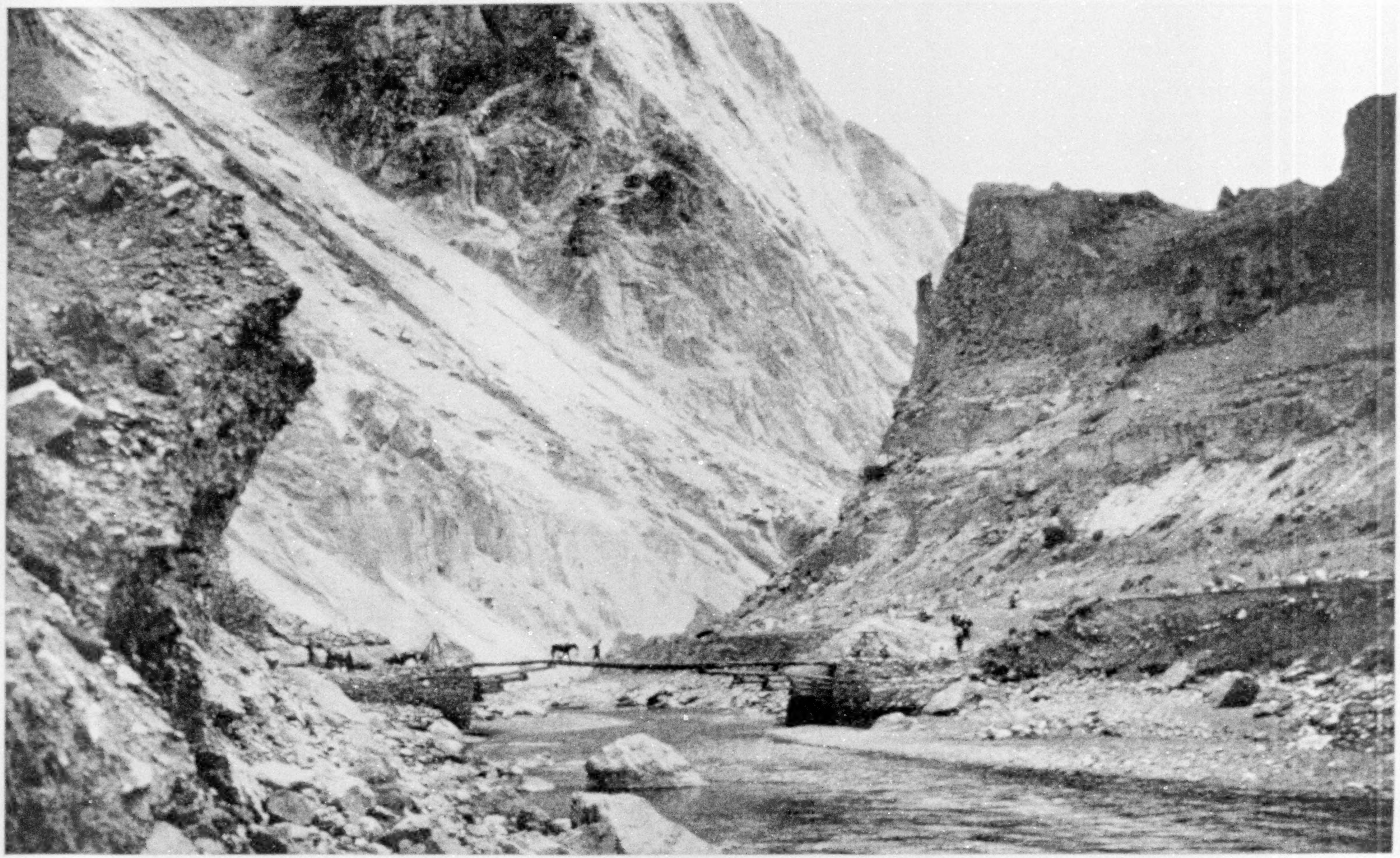
A PRIMITIVE SANDAL THAT SUGGESTS A MODERN FASHION

A "grass shoe" is made from rice straw twisted into ropes and is a customary form of footwear among the Himalayan people of Baltistan, Astor, and Gilgit, and among Kashmiris for mountain work. It is particularly useful for traveling over snow and rock (see text, page 376).



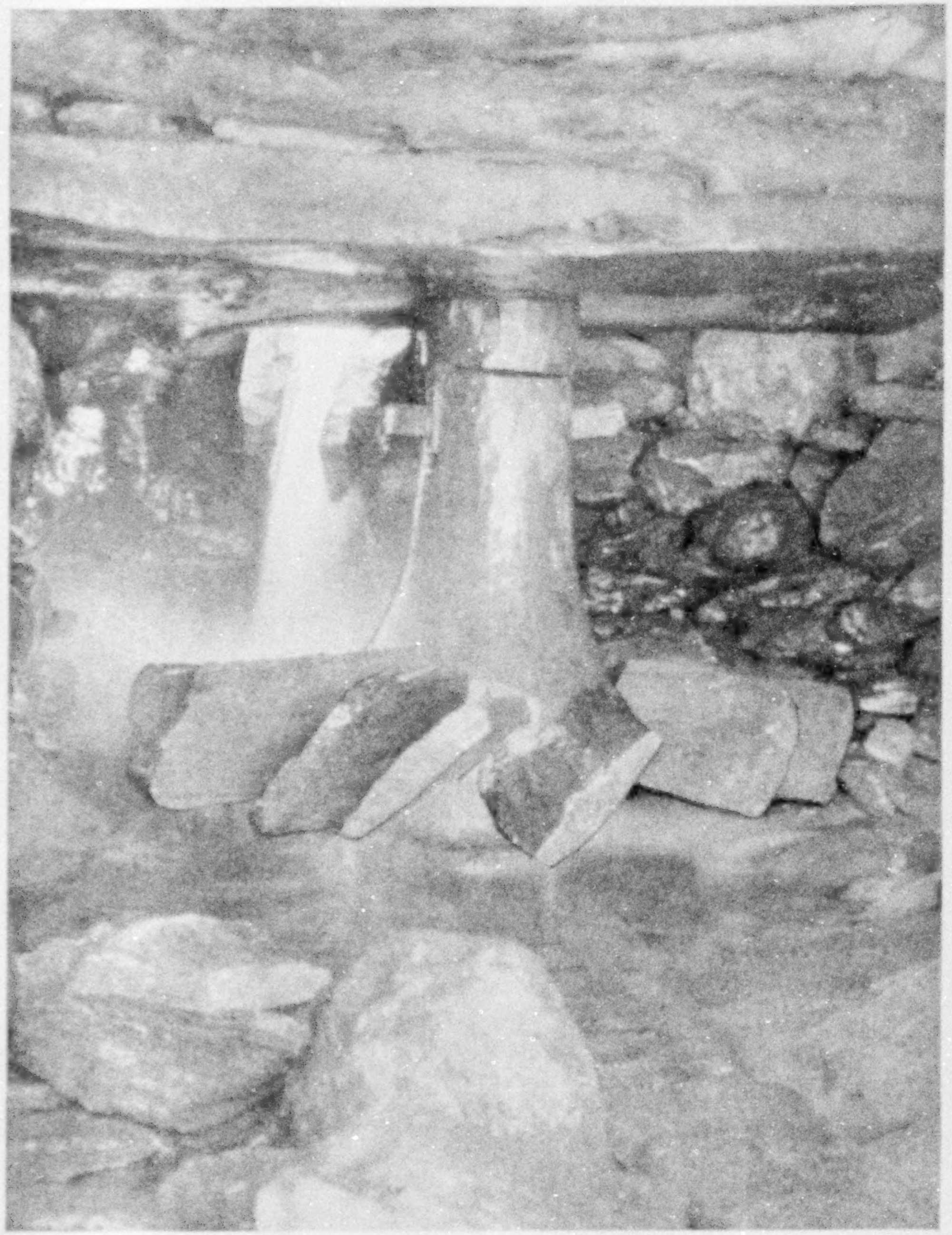
TOILERS OF THE GREAT WHITE SPACES

The Kashmiri coolie carries heavy loads over the mountain trails, and he employs a novel method of doing it. After walking or trotting a short distance, he places behind him his T-shaped stick and rests his load upon it. In this way he carries up to 60 pounds over difficult country, making from 10 to 15 miles a day.



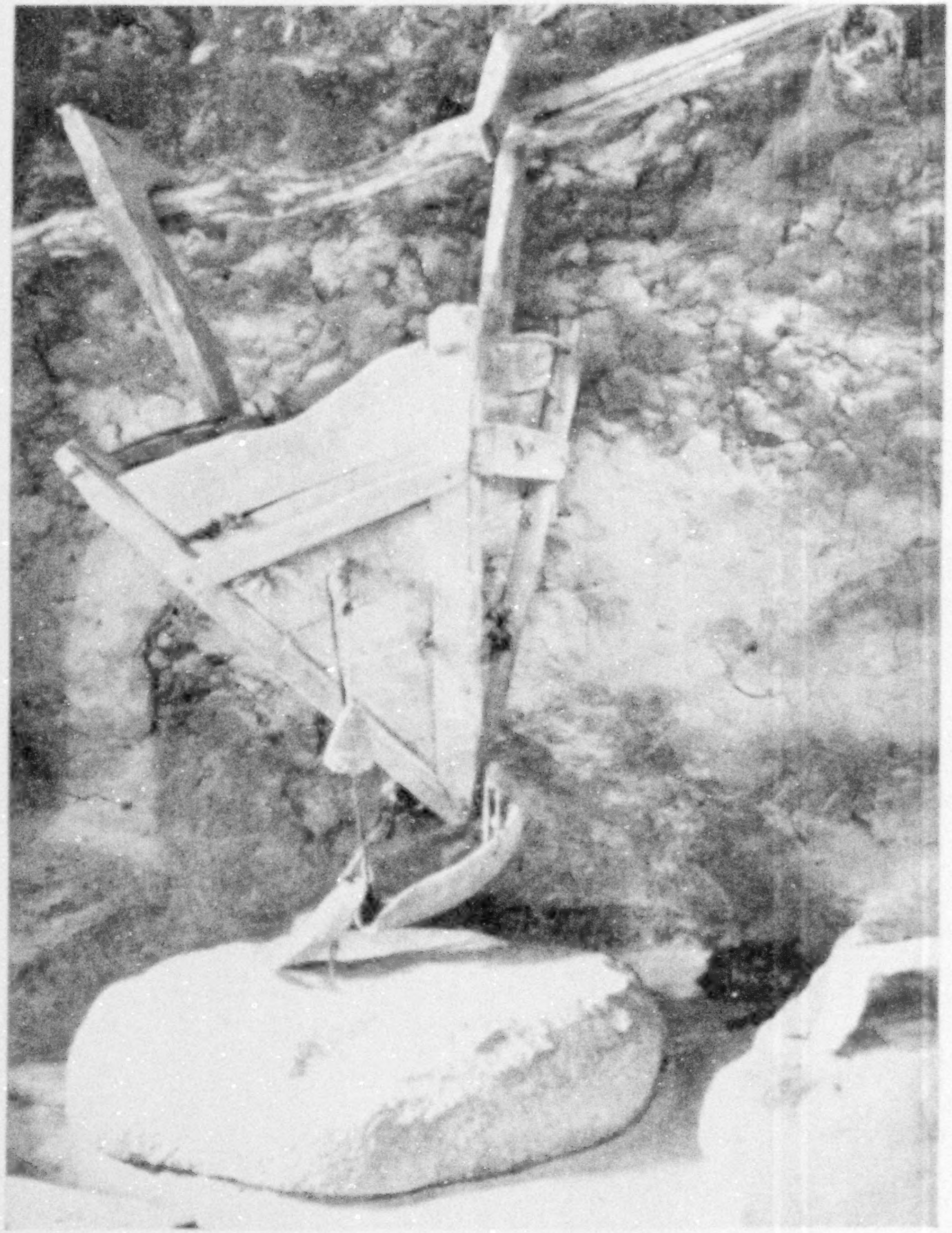
TRAVELING THROUGH THE HUNZA GORGES OFFERS A REAL THRILL

The winter trail, much of its distance, runs well down in the gorges, but, owing to high water, portions of it are impassable in the summer season. Then the way leads along cliff sides, high above the canyon, and at some places is built upon pegs and pole-props set into the rock. In such wild and rugged country the sturdy Hunzas eke out a miserable existence.



A PRIMITIVE POWER PLANT OF THE HIMALAYA

This type of mill, common throughout the Himalaya, is built below an irrigation ditch, and water pours through a hollow log, usually about ten feet long. The jet strikes the water wheel, which is connected to the movable millstone in the upper chamber of the building. The blades of the wheel are set into a hub, which usually is hewn from a tree trunk.



THIS WATER-OPERATED FLOUR MILL IS CRUDE BUT EFFECTIVE

The water wheel shown in the illustration on the left is rigidly connected to this upper stone, which revolves just above another that is similar. The grain sifts down between the two stones through a hole in the center of the upper one. The hopper is suspended above the millstones, and a small piece of wood or bone dragging from it creates the vibration that makes the grain trickle slowly out of the spout.

FORDING THE SWIFT GEZ RIVER

Many of the rivers of Chinese Turkestan are narrow and rapid, and their bowlder-strewn bottoms make crossing difficult. The Gez River, south of Kashgar (see map, page 374), cannot be forded during the summer floods, and the traveler from Kashmir to Kashgar must cross the hills by a route leading over seven passes.

Himalayan ponies are called. These shaggy little animals are not inspiring to look at, but carry 160-pound loads over difficult trails (see pages 373, 385).

As we descended, the snow on the lower slopes of the mountains lessened gradually, and we made good time for five marches to the village of Gilgit, the residence of the political agent, or representative of the Government of India in the Gilgit Agency.

THE PEOPLE OF GILGIT ARE IRRIGATION ENGINEERS

The Dards, inhabitants of this territory, number 10,000. They are scattered through the country in little villages of mud and stone huts, built amid tiny irrigated fields on large "fans" of débris which form at the mouths of valleys, and are the only tillable areas in that mountainous region.

Like other dwellers in the Himalaya, the people of Gilgit are excellent irrigation engineers. They have to be. Were it not for the watering of their little fields by tiny streams, led at great labor in canals along precipitous mountain sides, sometimes for miles, there would be no possibility of farming and life could not be sustained in that otherwise barren land. Inside the main range of the Himalaya there is little rainfall, as high peaks to southward catch the monsoon clouds which roll up from the Indian Ocean, and precipitation in the valleys is not enough for agricultural purposes.

Here there is constant struggle between men and Nature. If crops fail, famine threatens. A former political agent in Gilgit said he had seen people actually eating grass from the fields during famine. Because of the sparse population and the need for all available men in the fields, the Government of India discourages use of the Gilgit road by travelers and requests permit holders to limit their requirements as to transport and supplies (see, also, text, page 375).

We spent a day at the agency rearranging loads, as a few stages farther on, in Hunza, coolies would again be necessary.

Below Gilgit the trail had been wide and well made; beyond the agency it grew rougher, and as we entered the territory of Hunza the mountains became even more precipitous and barren. The Karakoram Range is cut by a series of deep gorges through which the trail winds and twists, ascending steeply over high spurs, only to descend again to the bottom of a gorge. In midsummer, when rivers are high, the trail follows the faces of steep cliffs, but early in the season one may, for the most part, use the winter track, which keeps more to the river level and is therefore much easier.

RAIDING CARAVANS ONCE A MAJOR INDUSTRY OF HUNZA

The scenery through the gorges is magnificent. Peaks of 20,000 and 25,000 feet tower above the trail, their sides covered with ice fields and glaciers and their lower slopes rocky and broken.

The small States of Hunza and Nagar, now under the protection of the Government of India, are peopled by a race known as Kanjutis—tall, fair, and quite evidently of Aryan stock. Formerly a main industry of Hunza was the raiding of caravans on the trade route between Ladakh and Turkestan over the Karakoram Pass. This was finally brought to an end by an expedition of the Government of India in 1891, and since that time the people of Hunza and Nagar have been friendly (see page 383).

We found them pleasant and likable. They are sturdy mountaineers, with an erect bearing and direct gaze. The Mir of Hunza, Mohammed Nazim Khan, at whose capital, Baltit, we stopped overnight, claims that his family came into the country from Persia 600 years ago.

Polo, a national game of Persia during the Middle Ages, has been the favorite game of the people of Hunza for many generations.

The Mir entertained us at dinner and did everything possible to help us on our way. Inasmuch as all labor for transport purposes is conscripted, although the men are paid for their work, it would be impossible to travel through that country without Government assistance.

Four more marches brought us to Misgar, where fresh coolies were obtained for the three remaining stages to Chinese territory. Misgar is the northern end of the India Government telegraph line, maintained for communication with the British consul general in Kashgar. From Misgar on, telegrams are carried to Kashgar by dak runners, the journey taking 12 days (see, also, map, page 374).

There are two passes into Chinese Turkestan, the Kilik and the Mintaka. They lie close together. The former is the easier, but impassable early in the season, being closed by snow until late June. Approach to the Mintaka Pass is through a rocky valley where no fuel can be obtained, so each coolie carries a few small pieces of wood on his back (page 394).

Crossing the Mintaka in April entails much traveling through deep snow and, owing to the altitude, 15,430 feet, it is a hard day's work. Once over the pass, however, one is in Chinese Turkestan and the descent to the Pamir is down a valley where snow melts early in the spring.

Pamir comes from the Persian, *Pai-Mir,* and means "foot of the mountain peaks." Pamirs are elevated mountain valleys of varying widths, separated by roughly parallel ridges cut by smaller and narrower valleys. There are eight Pamirs, one of which, the Taghdumbash, is in Chinese territory; one, the Wakhan, in Afghanistan; the remaining six are part of Russian Turkestan.

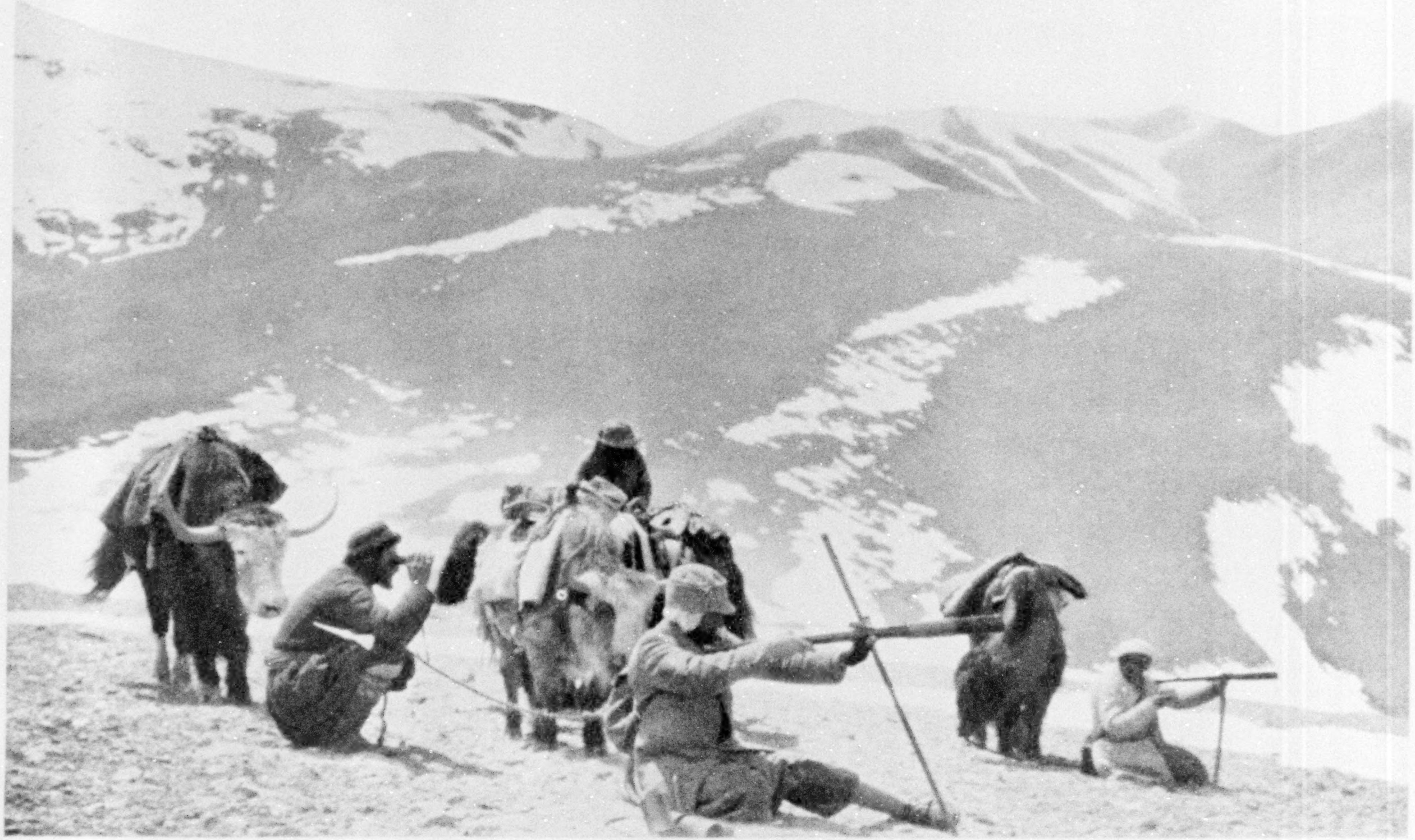
In the Taghdumbash dwells a race of Aryan people, the Sarikolis, believed to have come originally from Afghanistan. They have lived in Chinese territory for many generations, are largely agricultural, and, though not numerous, are a higher type than many of the inhabitants of central Asia. The district in which they live is known as Sarikol.

THE PAMIRS ARE DWELLING PLACES OF MANY REMNANT RACES

We found another race, the Kirghiz, also living in the Pamirs. These show a Mongoloid strain and are nomads, following their herds of sheep, goats, yaks, and camels about as the grazing changes. Kirghiz are found both in Chinese and Russian territory.

The Sarikolis have a few small villages in the Taghdumbash Pamir, although when away with their flocks they live in yurts, as do the Kirghiz.

A yurt is a most ingenious and comfortable dwelling, admirably adapted to the severe weather found in that region. It

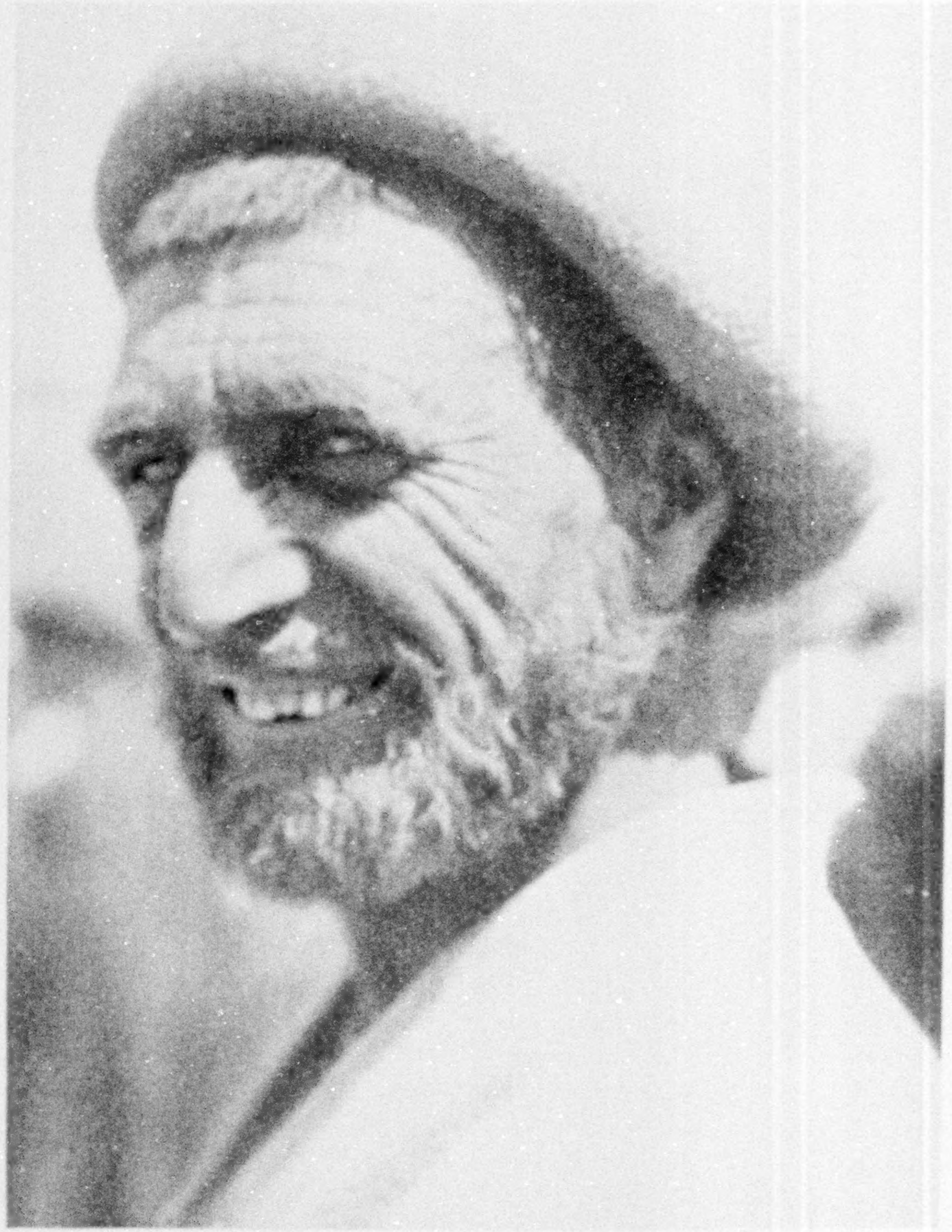


SCANNING "THE WORLD'S WHITE ROOFTREE" FOR THE SHEEP OF MARCO POLO

The hunting party, mounted on yaks, rides slowly through the Pamir country, with frequent stops to examine the landscape with field glasses. If poli are sighted, powerful telescopes determine whether the group contains desirable specimens. Wide detours must sometimes be made to get within rifle range (see, also, text, page 387). The sheep usually are found at elevations of from 15,000 to 16,000 feet and are most frequently seen in herds on distant hillsides.

HIS ANCESTORS MAY HAVE FOUGHT IN ALEXANDER'S ARMY

The Kanjutis are an Aryan race, thought by some to be descended from the soldiers of Alexander the Great. Although they differ in type from one locality to another, they are in the main a fine, upstanding race of mountaineers. The term "Kanjuti" is applied to the people of both the rival principalities of Hunza and Nagar.



THIS KANJUTI COOLIE SMILES AT HARDSHIPS

There is little surplus of grain in the Kanjut country of Hunza, so that the frequent crop failures mean famine. Every man is needed in the fields, and it is for this reason, especially, that the Government of India limits the number of permits for travel over the Gilgit-Hunza route (see text, page 380).

A WINGED MESSENGER OF DEATH

Falconing is practiced among the Hunzas, but not nearly so extensively as among some of the other tribes of central Asia. The quarry is usually birds and such small animals as hares and marmots. The goshawk is frequently trained for this sport.

is circular, varying from 12 to 20 feet in diameter, and made of large pieces of heavy felt over a framework of wooden poles. The sides, usually about four feet high, are a series of pantagraphs and, for transportation purposes, are collapsible.

To the tops of the sides are fastened curved poles, the upper ends of which fit into, and are supported by, wooden rings about four feet in diameter. The door frame, four feet high, can be covered with a piece of felt (pages 388, 390, 392, 416).

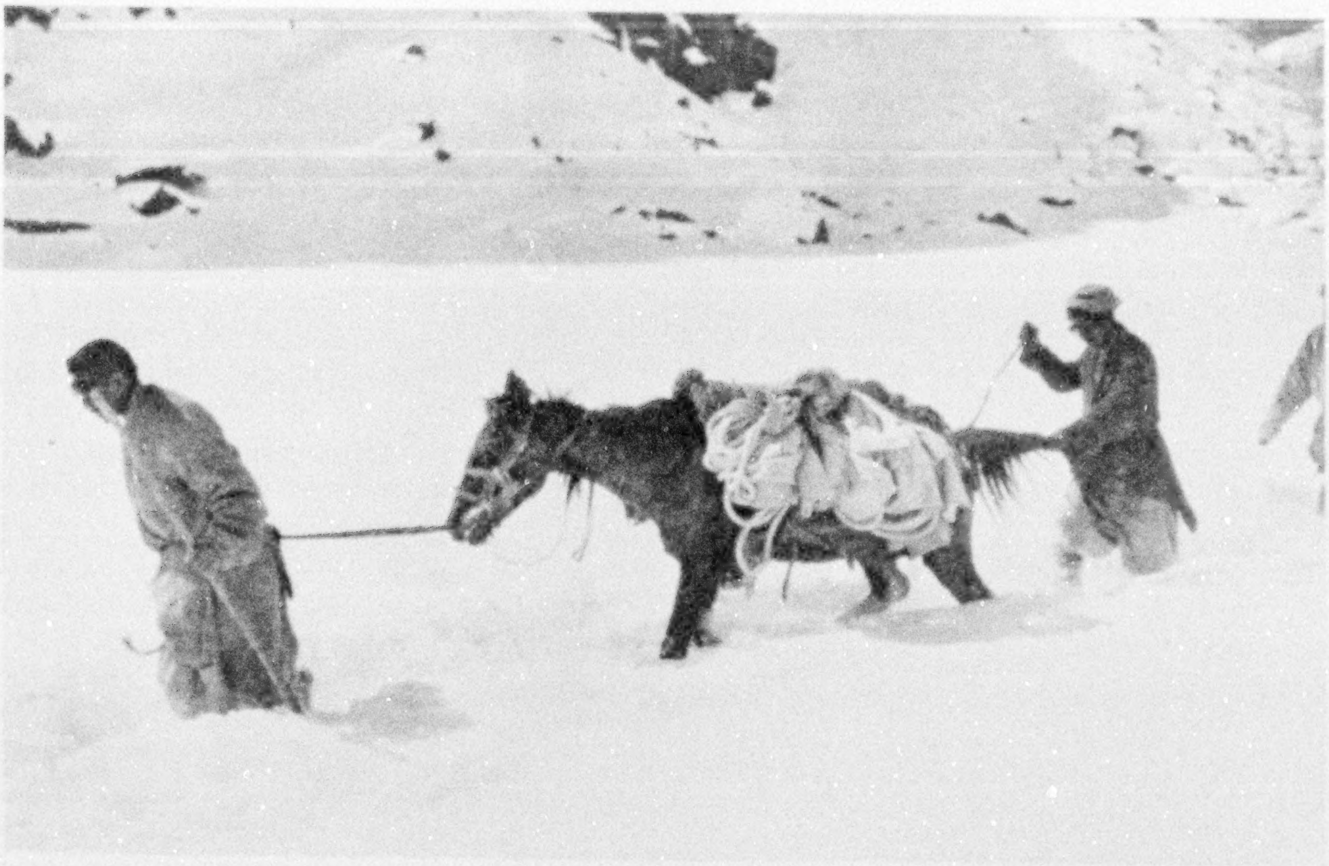
A fire of dried yak dung is made in the center of the floor, the usual method being to pile the fuel in a circle. The middle is filled with a dry variety of stunted sage, which, when ignited, kindles the dung. This burns with a bluish flame and makes excellent fuel. Smoke passes out through the hole in the center of the roof, which can be closed wholly or partly in bad weather by pulling another piece of felt over it.

On the way to the Russian border we inquired regarding our probable reception by the Russians and were told that, no matter what sort of papers we might have, it would be very dangerous to go into Russian territory, as the Bolsheviks were likely to arrest, rob, and either kill us or turn us out of the country without food or transport. We decided to send our credentials ahead and await return of the messenger near the boundary.

After five days he brought back word that the Russians were expecting two Americans. This seemed sufficient; so, after some difficulty in persuading our men to go with us, we crossed Beyik Pass, 15,470 feet, into the Russian Pamir.

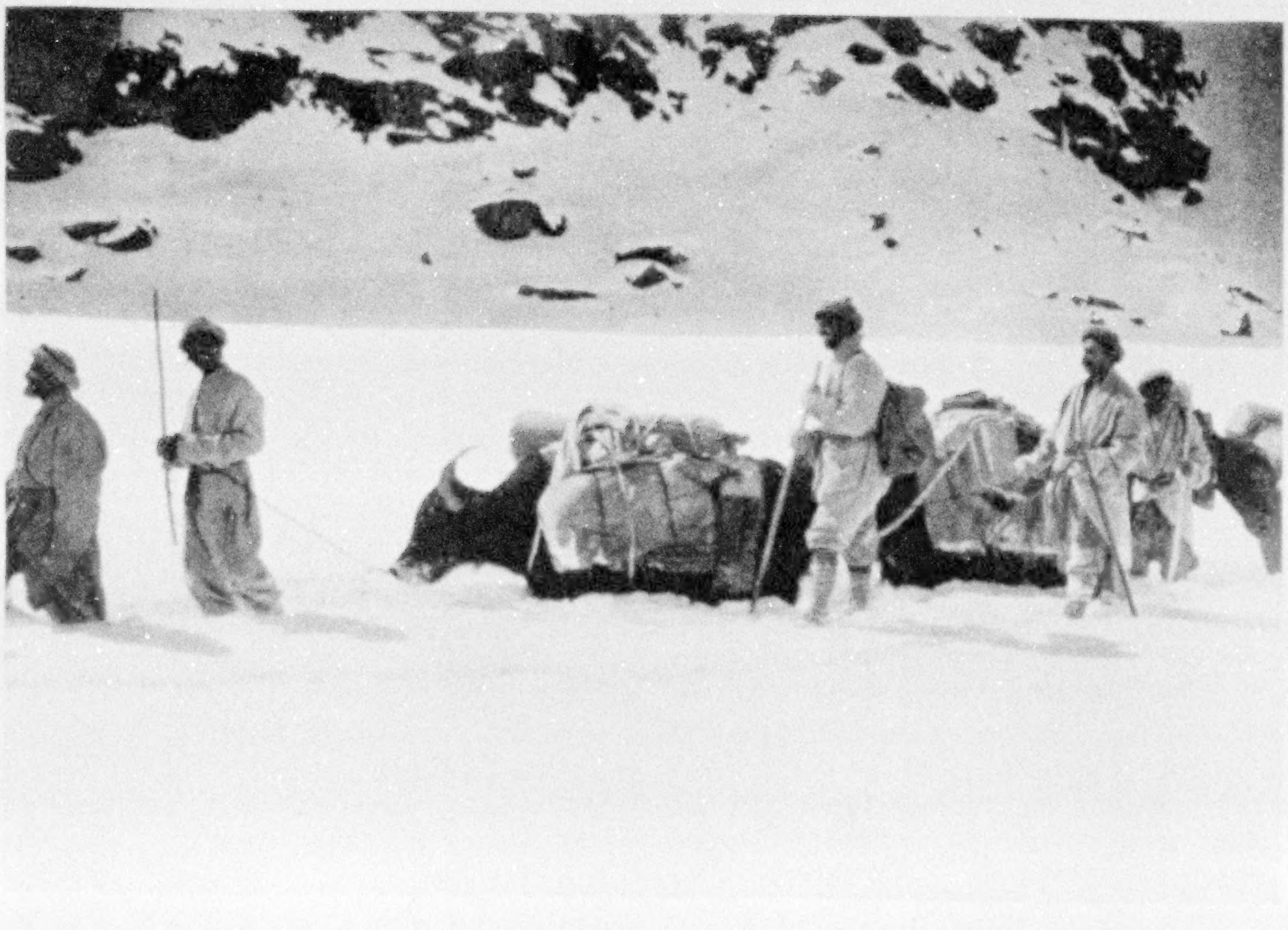
Once more it was necessary to break trail through deep snow, though we were able to ride yaks for much of the way. Views from the summit were striking, particularly that looking westward into Russian territory, for there the snow lay deep on ridges and in valleys.

Ten miles below the summit of the pass we were met by a squad of Russian soldiers mounted on wiry, shaggy, native ponies. They had been sent out to meet us by the commanding officer of Kizil



NOT MUCH TO LOOK AT, BUT STURDY AND GAME

The homely little Himalayan ponies, known as *tats*, are strong, sure-footed, and have marvelous endurance. They need all of these qualities to enable them to plow through the deep snows that bury the mountain passes in the early spring (see text, page 376).



BREAKING A TRAIL THROUGH THE SNOWS OF THE MINTAKA PASS

The yak is not native to Hunza or the Pamir, being found in the wild state in Tibet and Ladakh. The domesticated variety, however, forms one of the chief sources of wealth of the inhabitants of the Pamir.

Rabat post, 30 miles from the Chinese border and near the Afghanistan frontier. The men approached in military formation, riding four abreast, with an officer in the lead and a native orderly following.

Their uniforms consisted of high cavalry boots, blue riding breeches and tunics, thick, fleece-lined leather coats covered with long, belted and hooded dust coats, and cloth helmets with peaked tops and ear flaps, with the Soviet star in blue on the front (see page 391).

Their equipment consisted of rifles, bayonets, and sabers, the bayonets in rings attached to saber scabbards. One soldier carried a short automatic rifle; all had heavy bandoleers of ammunition. The officer was armed with saber and revolver.

THE YAK DOES NOT LEND ITSELF TO DIGNITY

We met the soldiers with mixed feelings, as we were still uncertain regarding our reception. They rode toward us at a sharp trot, drawing rein at command 30 feet away. We tried to look dignified on our yaks, a very difficult thing to do, as the yak does not lend itself to dignity.

The officer advanced, saluted, and presented a letter. As it was in Russian, we could not read it. He told us, however, that it was intended for a welcome, saying that yurts had been prepared for us five miles farther down the valley, and that the officers at the post hoped we would visit them in the next few days.

Preceded by the soldiers, we rode on to the yurts, dismounted, and shook hands all around. The soldiers stayed with us that night and made pleasant companions, although the necessity of having three interpreters made conversation difficult.

Leaving our kit at the yurts, the following day we rode with our escort to Kizil Rabat. The three officers of the post entertained us and assured us that we would be free to travel as we pleased and collect as many specimens as we desired.

When asked how many Ovis poli we wished to shoot, we replied ten. One of the officers said that we had come a long way and had done much hard work to take such a small number. He suggested that we shoot a hundred. We did not want so many Marco Polo sheep, but it was cheering to learn that the animals were to be found in numbers. On our way to the post we had seen our first poli, 13 rams climbing a slope high up on a mountain to the left of our line of march.

Officers and men at Kizil Rabat were far from the savages they had been pictured by natives in Chinese Turkestan. We found the former, in particular, bright, alert young men, and discipline seemed to be excellent among the garrison of 10 or 15 hardy-looking soldiers. When we left the post to go back to our yurts, the soldiers of the escort gave us some tinned milk and sugar, saying that, as they had accepted our hospitality, they wished to make a present in return.

On the way back to our previous camp we stopped at a hot spring three miles from the post. There, at an elevation of more than 12,000 feet, on a small island in the middle of an icebound river, was a spring of hot sulphur water bubbling from the ground. Though the temperature outside was considerably below freezing, steam from the water kept the inside of a yurt placed over the spring comfortably warm, and all of us indulged in a most welcome hot bath.

A young officer accompanied us to camp and stayed during the first few days' hunting. He was said to be with us as a guide and to see that we found game, though we suspected that he came to observe our movements and purposes.

HUNTING THE OVIS POLI WITH THE YAK

Were it not for yaks, hunting in the high country of the Pamir would be almost an impossibility. Early in the season snow lies deep on mountain sides, and horses are useless for hunting. The yak, however, can negotiate steep slopes and deep snow in a manner which is a revelation. During the time spent in the Pamir we came to look upon these uncouth beasts with great respect (see pages 382, 395).

Snowstorms made hunting impossible for part of the time, but we were able to collect two or three excellent specimens of Ovis poli in the first few days. Moving camp farther into the country, we continued collecting at several points and obtained a complete series of the animals, ranging from large rams, with horns nearly five feet around the curl, to young lambs, and including whole skeletons of males and females.

All were in excellent winter pelage, which greatly added to their value as group specimens. The labor involved in preparation of specimens was necessarily great, though Mr. Clark handled this work, in addition to keeping up with the hunting party (page 393).

The quest for Ovis poli involves covering great distances. Much of the country is open; so it is often necessary to locate the animals from a distance, and then make a wide detour to get within rifle range.

Mounted on yaks, the hunting party rides slowly along, stopping frequently to scan the landscape with field glasses. Upon sighting a number of poli, powerful telescopes are used to determine, if possible, whether the herd contains desirable specimens.

If so, an advance is made behind whatever cover is available. Often the sheep are lying in an exposed position and a close approach is impossible, in which case one must wait until the animals begin to feed, usually late in the afternoon. Often the hunter is forced to lie among rocks and on snow for hours, awaiting a favorable opportunity to advance near enough to shoot (page 382).

As I had suspected, Ovis poli, while scarce in the Chinese Pamir, were plentiful in Russian territory. In our month there we counted 1,056 rams and more than 600 ewes and young.

Great numbers of old heads and horns lay about the valleys. At first we thought that these had been winterkilled, but soon learned that the Kirghiz shoot many of the animals for food, lying in wait behind piles of stones when the sheep come down into the valleys to feed (see page 397).

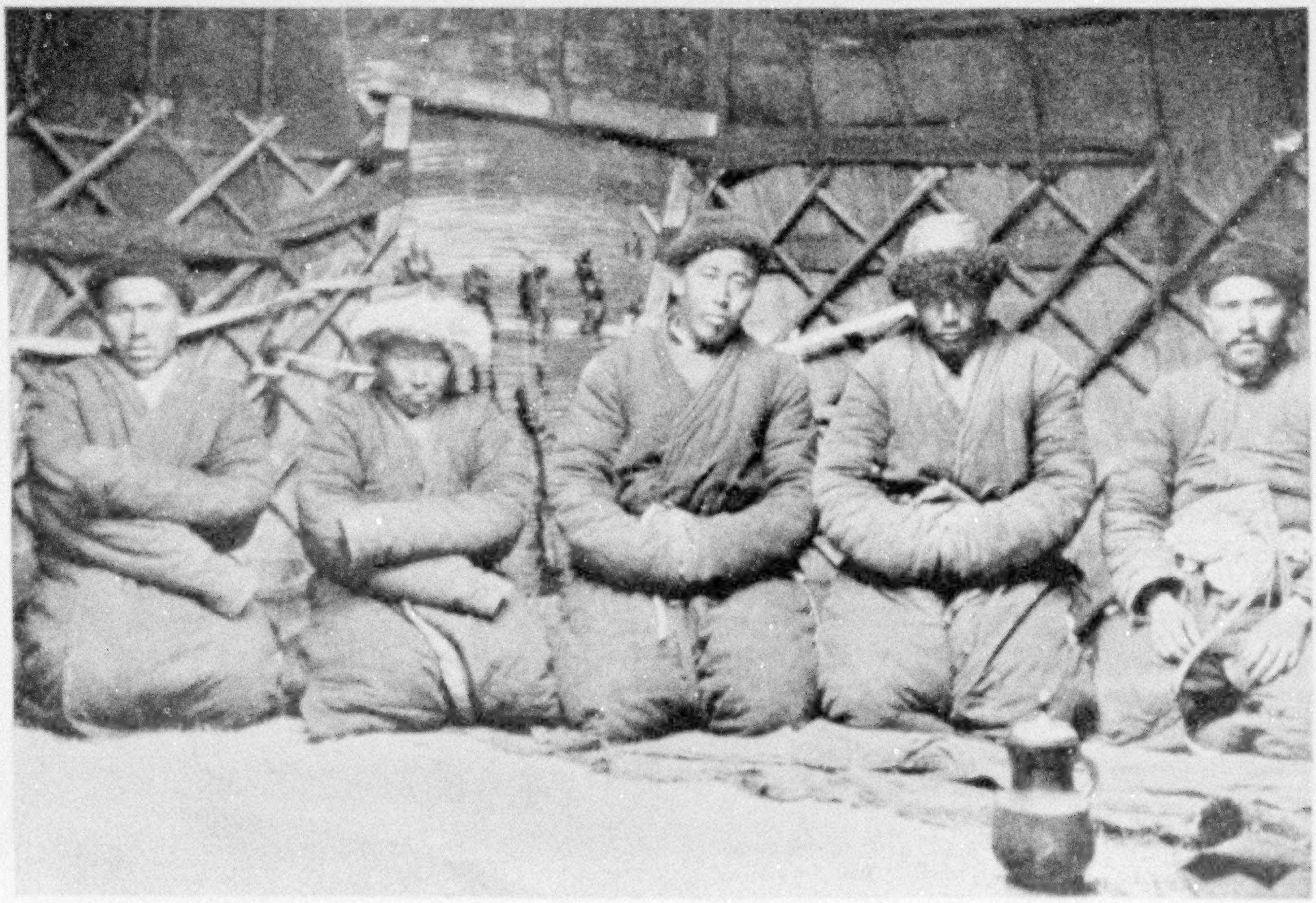
Until a few years ago the natives had only the crudest firearms. One still sees many ancient matchlock and flintlock weapons, though increasing numbers of modern breech-loading rifles now find their way in from Russia. It is to be feared that in a few years the herds of Ovis poli will be materially decreased.

By the end of May our work in the Pamir was finished and we made our way back into Chinese Turkestan. A week's hard travel northward through

THE WOODMAN IS AN IMPORTANT PERSON IN THE HIMALAYA

As almost no wood grows except in irrigated areas of the Himalaya, fuel is bought by travelers from the caretakers of the resthouses along the Gilgit Road. This coolie is chopping up the scanty wild juniper which occurs in scattered areas on the lower slopes of the mountains.

CHILDREN OF THE WORLD'S ROOFTREE



A STAG PARTY INSIDE A YURT

The man at the right is a Sarikoli, an Aryan dweller on the Taghdumbash Pamir, in Chinese Turkestan; the others are Kirghiz, who are found both in Chinese and Russian territory. The long sleeves, characteristic of central Asian coats, serve as muffs when the hands are placed together. The coats usually are of quilted cotton, since the wool obtained from the herds is sent to Russia and sold.

120 miles of mountainous country brought us on June 6 to Kashgar, the largest city of Chinese Turkestan. Here much time was spent in preparing Ovis poli specimens for shipment home via Kashmir and India, and in replenishing stores from such supplies as could be obtained in the bazaars (see illustration, page 399).

Kashgar is a city of 80,000 people, a majority of whom are Turkis, as the natives of Turkestan are called. Yet there has been some admixture of alien bloods.

ONLY 30 RUSSIANS REMAIN FROM FORMER LARGE COLONY

There are now about 30 Russians living in Kashgar, though before the World War there was a large colony. The Russian Consulate General, now occupied by the Soviet consul general and his staff, is an imposing array of well-constructed brick buildings. They surround a large compound, with spacious quarters, offices, and barracks for the large consular guard which was maintained under the old régime. A few of the Russians now living in Kashgar have refused to recognize the Soviet consul, though most of them have done so.

Chinese Turkestan is ruled by a provincial governor, who resides at Tihwafu (Urumchi), the capital. Under him are five local governors, each administering considerable territory with the aid of several subgovernors. The latter are usually referred to as "Ambans," though this is a title of respect that may be applied to other Chinese officials. All of the higher authorities are Chinese, but the Begs, their subordinates, who collect taxes, arrange irrigation matters, and attend to smaller items of government, are Turkis, usually the most prosperous and influential men in their communities.

Considerable trade is done in Kashgar. Wool, sheepskins, and cotton are exported to Russia, and iron, oil, and manufactured goods brought back from Andizhan in Russian Turkestan, a journey of two weeks by caravan to the west. Oil is found not far from Kashgar, but to date the development is not of any consequence.

A few years ago the Chinese Government built a series of radio stations at Kashgar, Tihwafu, and Urga, in Mongolia. These formed a chain of communication through the one at Mukden, in Manchuria, connecting Turkestan and Peking. As that at Urga is now in the hands of the Mongols, Chinese stations do not communicate with it, though Tihwafu can talk directly with Mukden. One can also send radio messages from Kashgar to the outside world via Peshawar, in India, whence they are forwarded by cable.

While in Kashgar we were the guests of Major and Mrs. Dillan at the British Consulate General. It was there we received word from Dr. Roy Chapman Andrews that the fighting around Peking would prevent the Central Asiatic Expedition's start into the field in time to connect with us at Hami, as planned (see text, page 375). We therefore decided to leave the country when our work in the Tien Shan was finished.

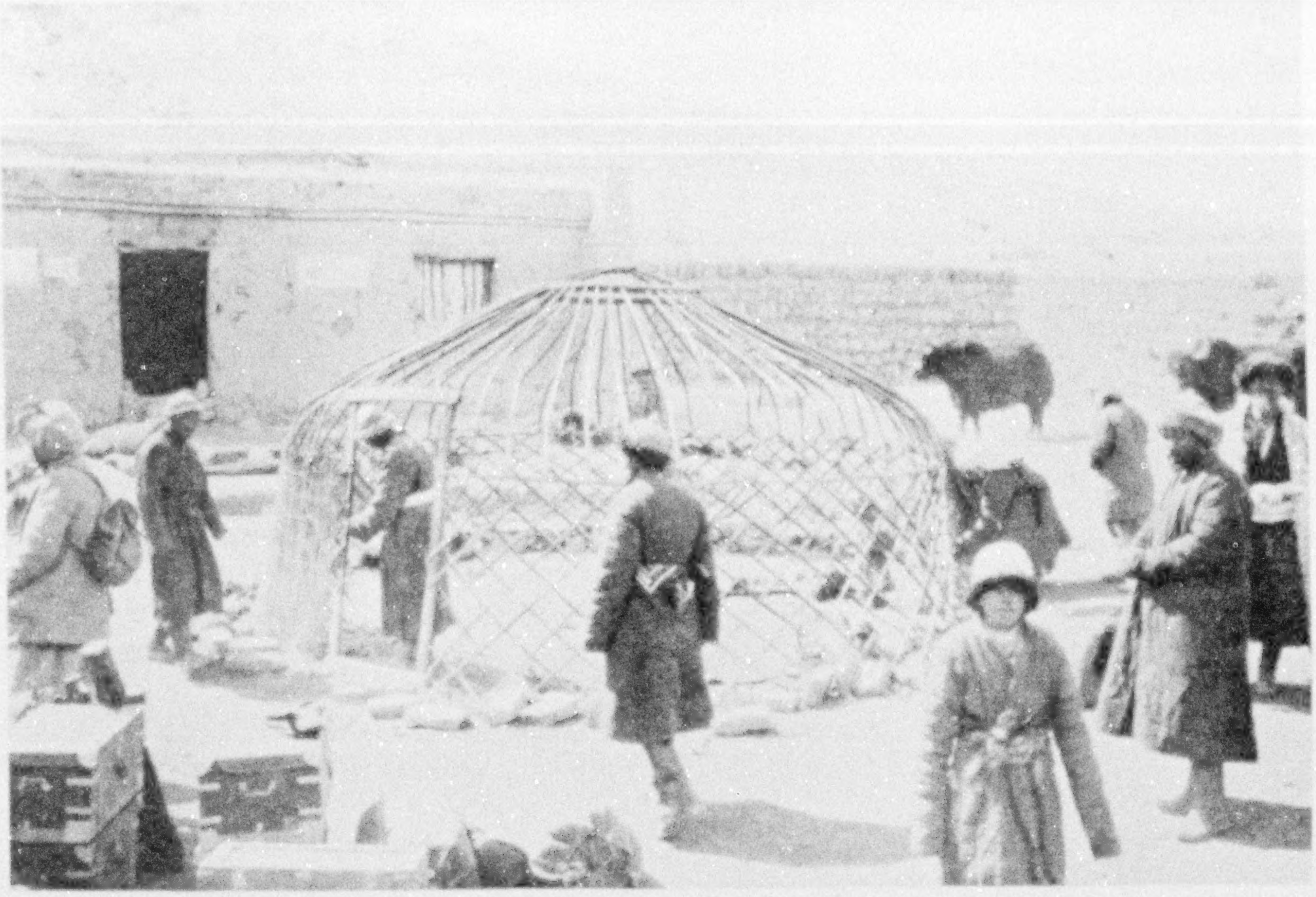
We concluded to attempt the crossing of Mongolia by caravan. This would give Mr. Clark opportunity to study the habitat of many animals which his department was mounting; also there was an excellent chance of finding the saiga antelope (*Saiga tatarica*), an interesting and rare variety.

Little could be learned regarding our probable treatment by the Mongols, though we were told by the Russian consul that he would request Moscow to instruct Russian representatives in Mongolia to assist us in every way possible. As the distance was little greater than a return by way of India, the attempt seemed worth while.

CURIOUS TYPES OF VEHICLES

From Kashgar three of our Kashmiri staff went back with the poli collection by the long route over the Karakoram and through Ladakh—a journey of two and a half months. As the others would return from the Tien Shan, a native of Kashgar was engaged as cook and general utility man for the remainder of the journey. Mohammed Rahim spoke Hindustani, Turki, a little Chinese, and one or two other languages, and proved a faithful and useful member of the expedition (see illustration, page 406).

From Kashgar *arabas* and *mapas* were



THE STRUCTURE OF A YURT RESEMBLES A CAGE AT THE ZOO

When completed, large pieces of heavy felt cover the framework of wooden poles, and another hangs across the doorway. An opening is left in the top to permit smoke to escape from the fire of yak dung, kindled in the center of the dirt floor. Sometimes the inside is carpeted and the walls hung with embroidered cloths. The yurt is used both by the nomad Kirghiz and the agricultural Sarikolis (see, also, text, page 381).

used for baggage transport. We traveled on saddle horses loaned by Chinese officials. The former are heavy, strongly made Chinese carts of 8-foot gauge, having two wheels about six feet in diameter. They are drawn by two to five horses. When five are used, one is placed between the shafts and two others alongside. As arabas are necessarily very slow, we started them in advance with the heavier kit (see page 404).

Mapas are lighter carts with narrow bodies, usually drawn by three horses, and make better time than the lumbering arabas (see page 413).

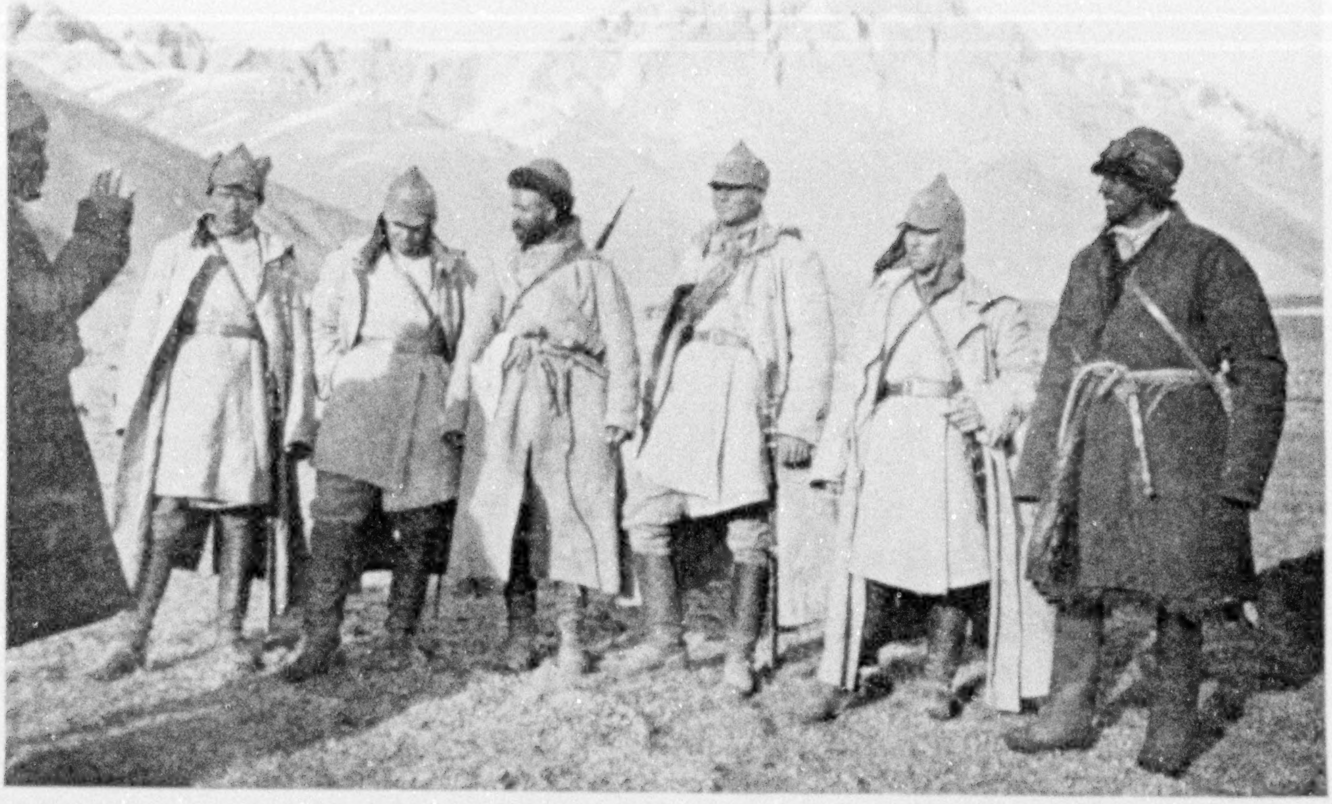
TRAVEL BY NIGHT TO AVOID FLIES AND MOSQUITOES

Travel from Kashgar to Aksu is usually at night. In daytime the flat plains become exceedingly hot and there are many flies and mosquitoes. Much of the day is spent in resting at native serais, little inns by the wayside.

Practically all Kashgaria is a desert, except where irrigated. Much of the way leads across sandy plains, broken at intervals by low hills and areas where a growth of tamarisk has formed mounds of drifting sand and dust. Water along this road is brackish, its alkali taste making it exceedingly unpleasant for drinking purposes.

A few miles before reaching Aksu the road strikes the Aksu River, at that point nearly a mile wide and too deep to ford. A large scow, about 30 feet long, is used as a ferry. When loaded, the craft is pushed into the river, several men row like mad near the bow, and the ferry is carried far downstream, coming ashore against a low bank. Our two mapas, eight horses, and some 40 people, with their belongings, were crowded aboard the scow, which, though deep in the water, made the crossing safely (see page 405).

At Aksu it again became necessary to change money. We had brought from India silver rupees, which had been changed in Kashgar to Kashgar taels, the



PEAKED HELMET AND SOVIET STAR MEET THE SCIENTISTS

These soldiers rode from the Russian military post at Kizil Rabat, 30 miles from the Chinese border, to escort the expedition into Soviet territory. The man with upraised hand (left) is a Sarikoli interpreter who accompanied the scientists while they were in the Pamir. The man at the extreme right is another Sarikoli interpreter, employed by the Russians at the post (see, also, text, page 384).

latter worth about 90 cents. We also bought a small amount of Imperial Russian five- and ten-ruble gold pieces in Kashgar; for, though these are not current, they can be sold in bazaars and are easier to carry than large bundles of paper taels. In Aksu, Kashgar taels were changed to Tihwafu taels at the rate of one Kashgar tael to three of the latter.

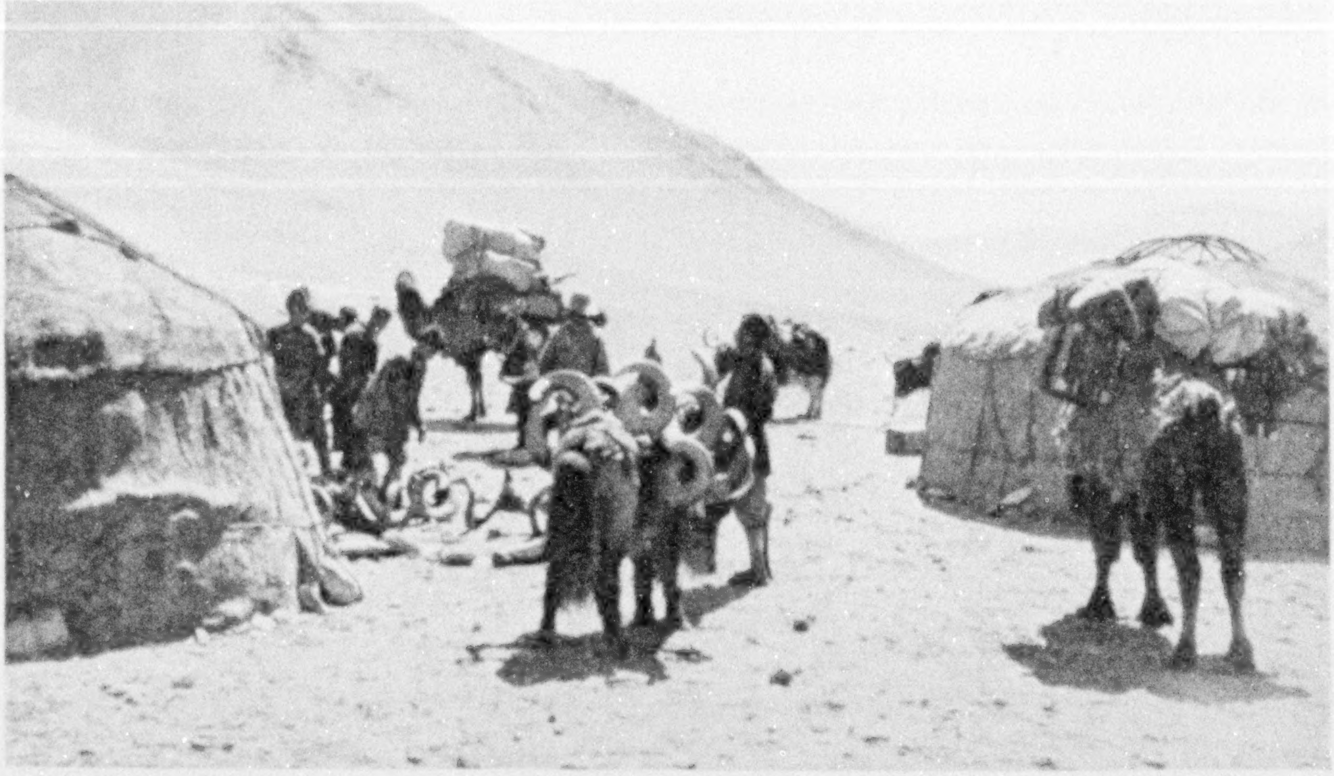
BUNDLES OF PAPER MONEY PRESENT PROBLEM

As we had to carry several thousand of these paper taels, caring for this large amount was always a problem. I inquired why the Governor of Sinkiang did not issue notes of larger denomination than one tael, and learned that were it done there would be much counterfeiting. As the penalty for that crime is death, the governor felt that he was saving the lives of many of his people by having but one-tael notes printed, since he thought the incentive not great enough to encourage counterfeiting.

Later we changed Tihwafu taels into Chinese silver dollars and silver bullion, which, on account of the weight, had to be spread among many boxes of our kit. All this metal again was changed into Soviet rubles in Mongolia, which were changed back into Chinese dollars and Japanese yen in Manchuria.

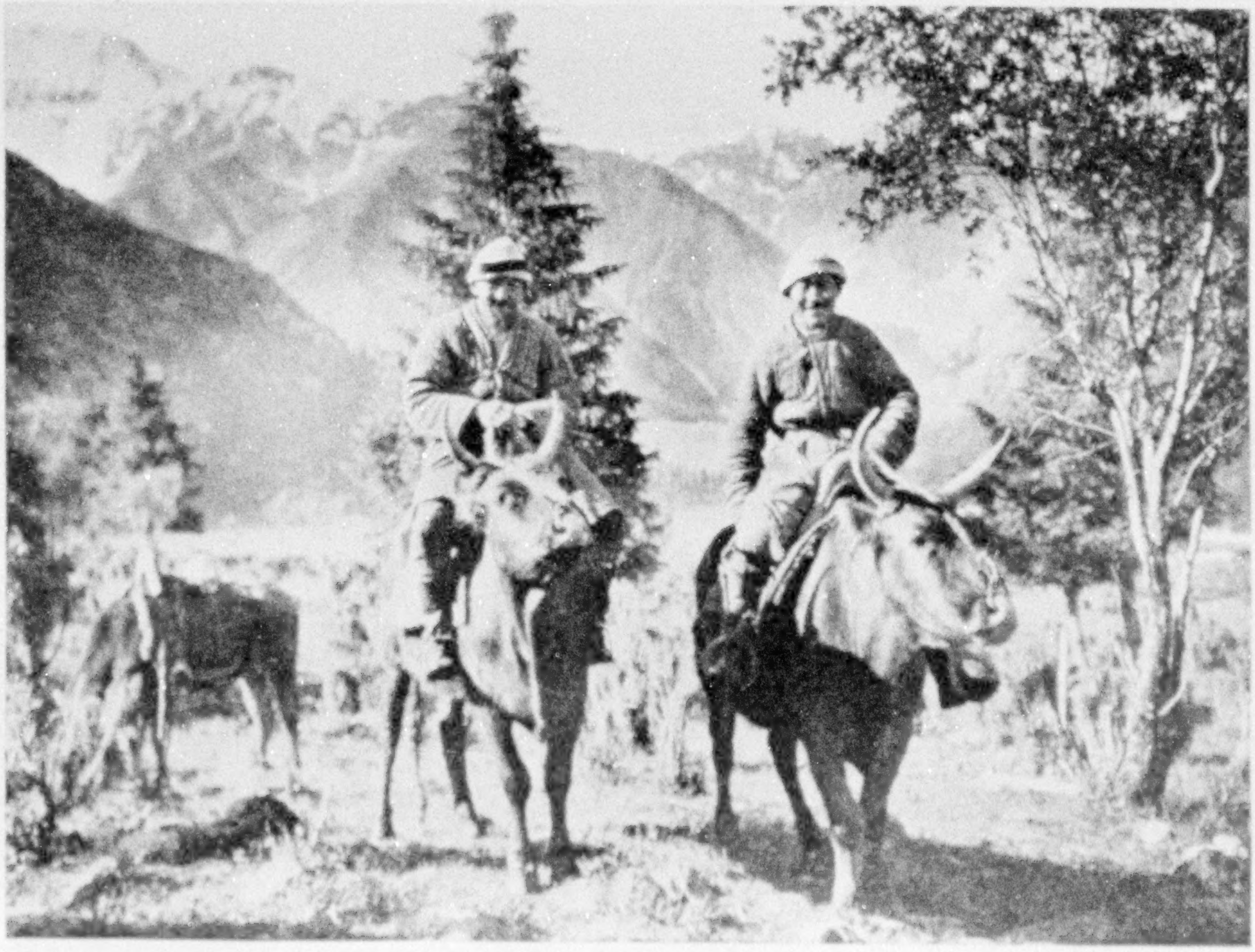
On the first of July we left Aksu with a pony caravan and started northeast, toward the white-topped wall of the Tien Shan, which had been growing closer day by day. Before reaching it, a few days were spent on the plains hunting the yarkand gazelle (*Gazella yarkandensis*), a few of which are found on the wide *sai*, or desert of stone and gravel, near the base of the mountains.

A main route into the Tien Shan from the plains of Kashgaria lies along the Muzart Pass, 11,480 feet high. As the trail leads for five miles or more up the broken surface of the Muzart Glacier, the crossing is more difficult than that of many passes whose elevations are considerably



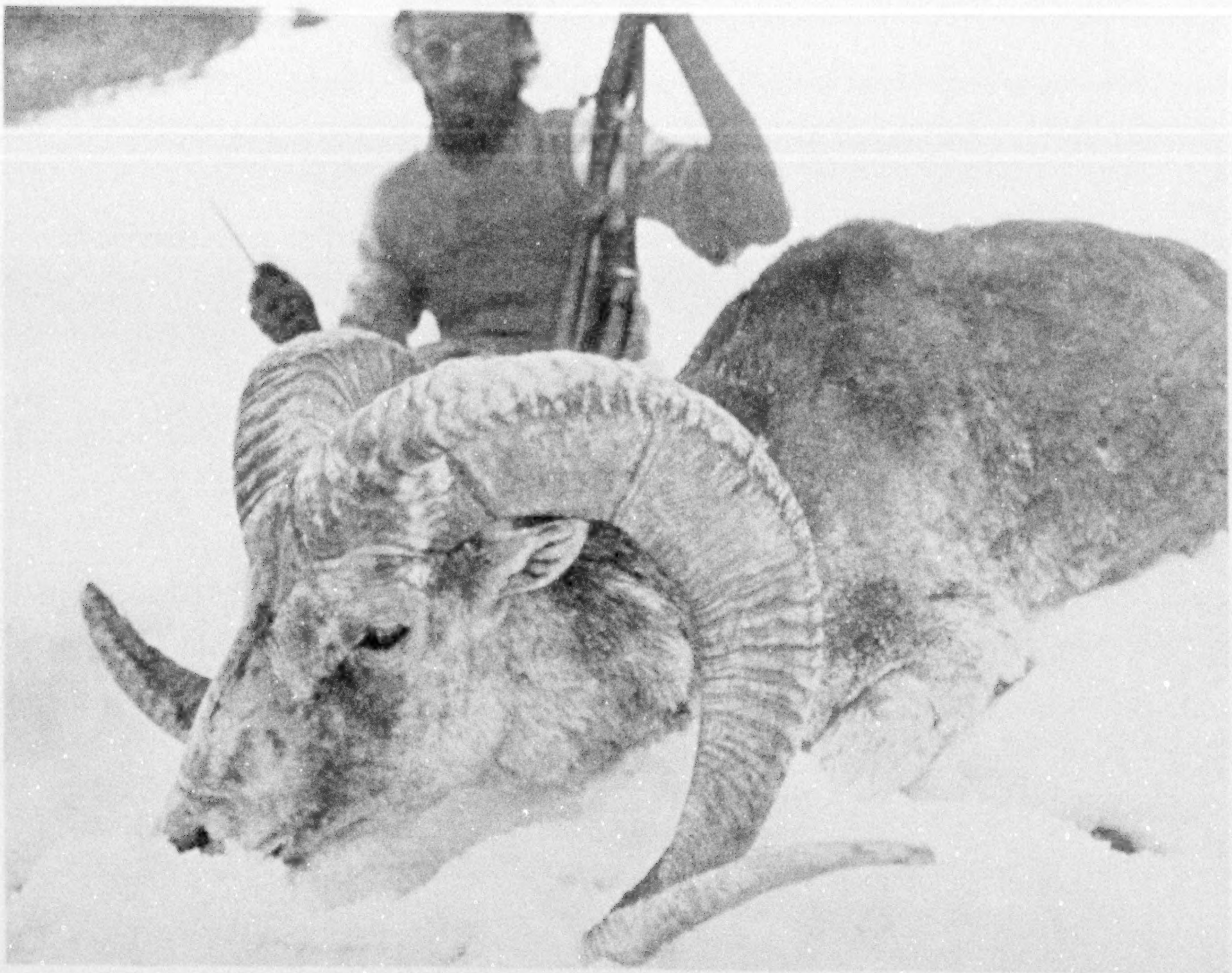
PACKING UP TO LEAVE THE RUSSIAN PAMIR

Ponies sent out from Kashgar were used for much of the expedition's travel in the Pamir country, but lack of forage made it necessary to send them back. For the 120-mile journey from Russian territory to the city, local yaks, camels, and ponies were obtained.



BULLOCK STEEDS OF THE CELESTIAL MOUNTAINS

Though the Kirghiz of the Tien Shan own horses, many ride bullocks for short distances. Among the snowy peaks and forested lower slopes of their mountain homeland, which stretches through the northern part of Chinese Turkestan, live various wild animals of value to science.



THE MARCO POLO SHEEP IS A COVETED BIG-GAME TROPHY

The famed Venetian traveler was the first European to describe these "wild sheep of great size, whose horns are good six palms in length." Six centuries later his accuracy was proved, and his name given to this magnificent progenitor of wild sheep. Marco Polo's "six palms" may be equivalent to 5 feet, a conservative estimate, since record Ovis poli horns far exceed in length the measurements of those of any other known sheep, the largest being 6¼ feet around the curl.

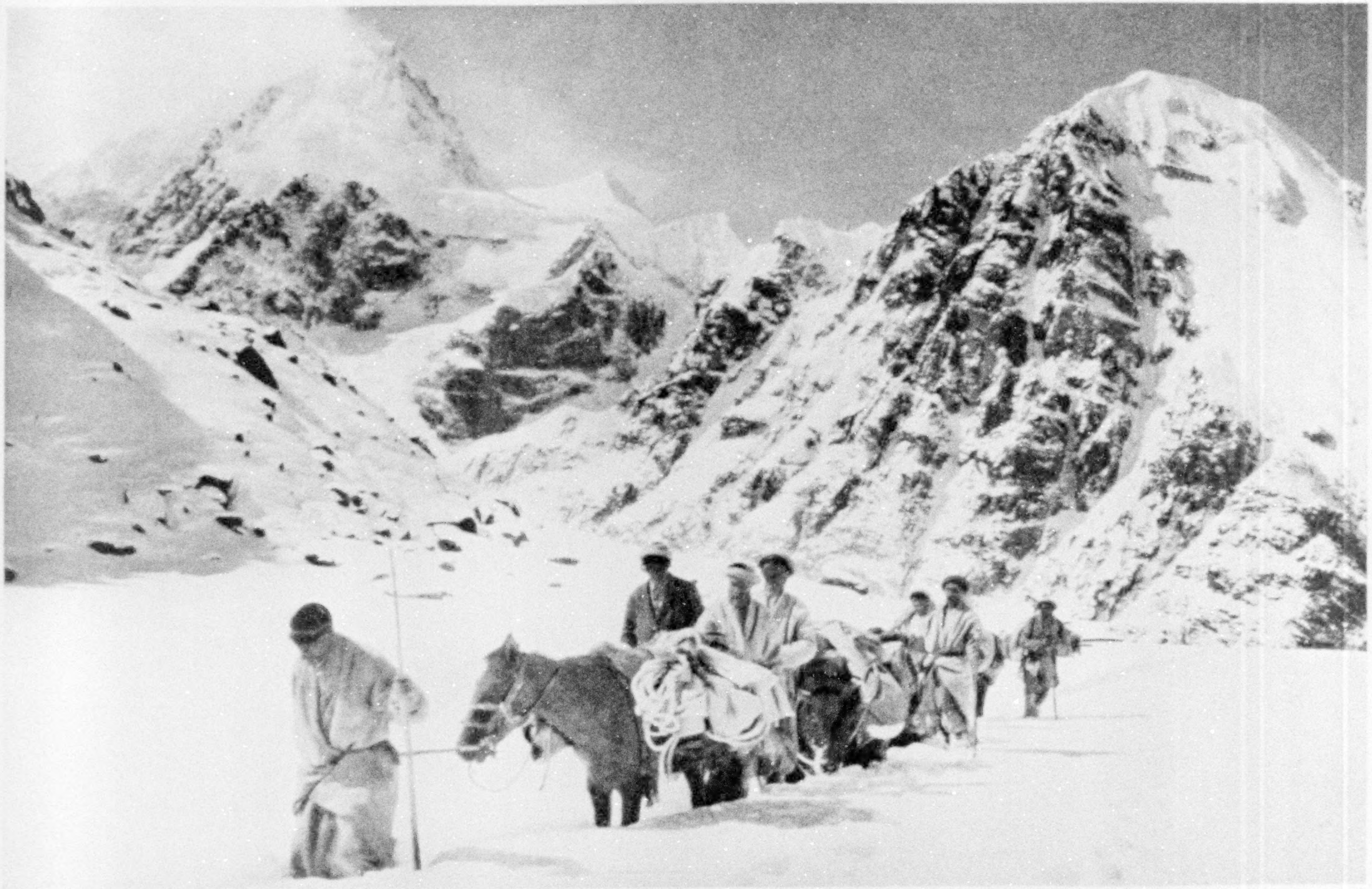
greater. Crevasses yawn on either side of the trail, which winds among huge masses of solid ice and amid thickly strewn bowlders that are often higher than the struggling pack animals. In many places steps must be cut in the ice (page 409).

On both sides of the trail lie skeletons of horses, donkeys, and camels, usually with broken bones, showing plainly why they have been left behind. These gruesome reminders of the struggle are practically continuous for the total distance along the glacier. Although our horses were constantly falling and it was desperate work to get them over the many steep places, luckily we lost no animals.

After five miles the route swings north across the glacier and over a low saddle, the summit of the pass. The descent is steep in places, but less arduous than the glacier trail, and the reward on reaching the valley is fully worth the effort of crossing.

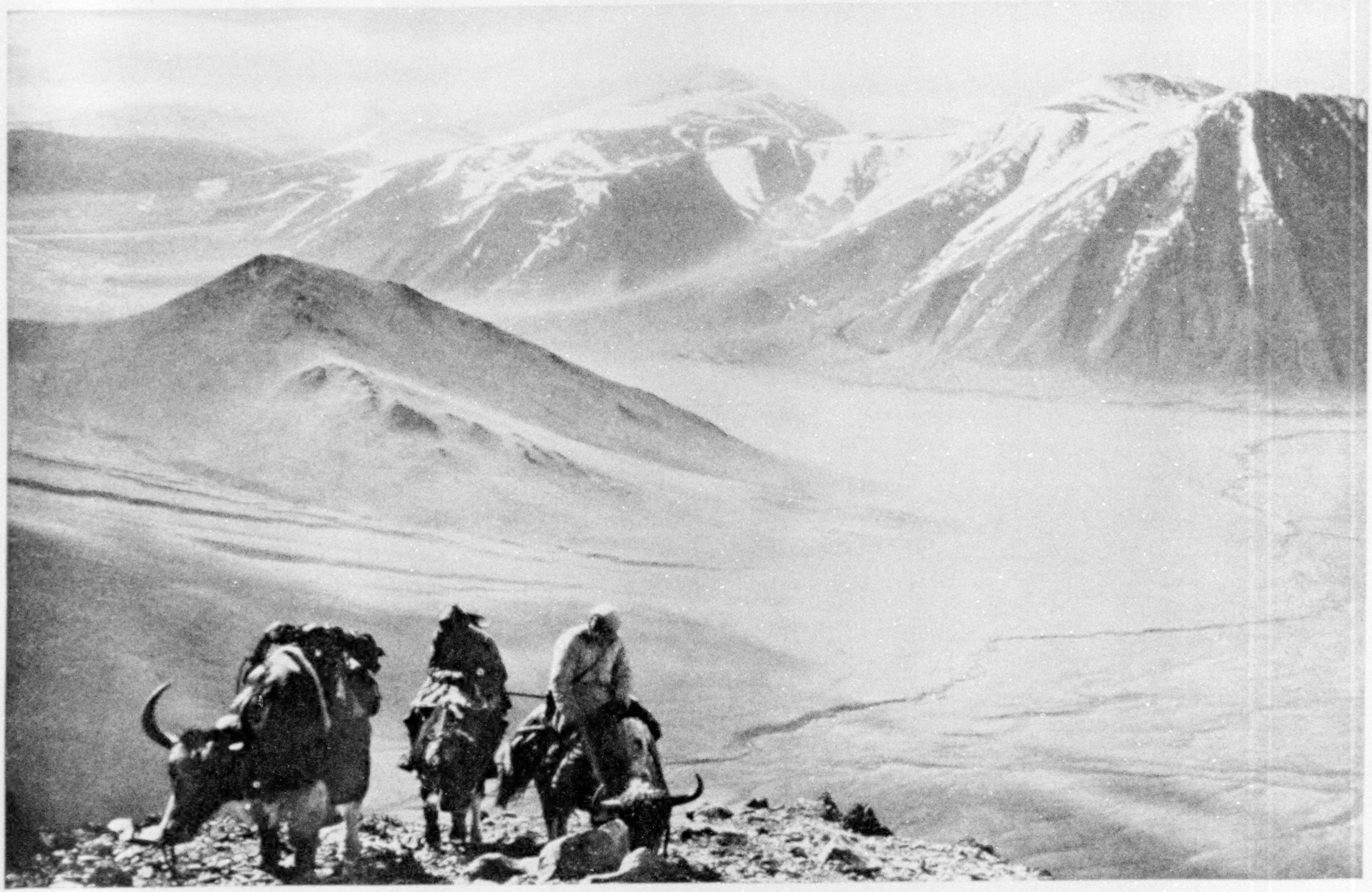
When the traveler drops down on the north side of the Muzart Pass, he finds himself in a land of springtime. Forests of pine and spruce cover the northward-facing slopes; valley sides and bottoms have a thick growth of grass and wild flowers. We counted more than 20 varieties of the latter, growing in a profusion that was almost unbelievable. Large areas were literally carpeted with them, and their bright colors, mingling with the thick green grass, made a welcome change from the bleak desolation of the mountains we had just crossed.

At a village below the pass we spent several days collecting a group of Tien Shan roe deer (*Capreolus pygarus tienshanicus*)—*illik*, as they are called in Turki. These little animals are found in



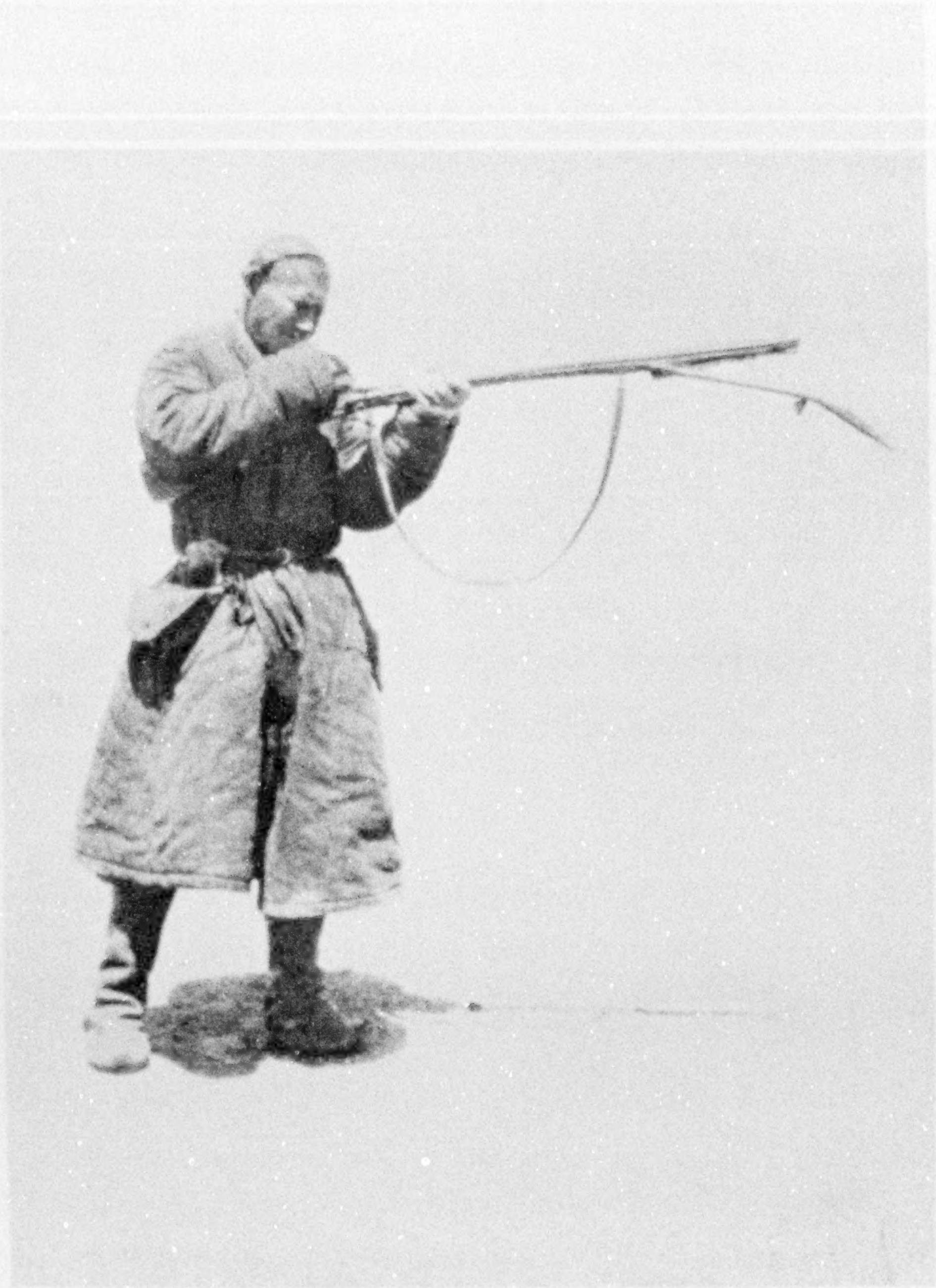
IT'S A LONG, HARD TRAIL TO THE OVIS POLI COUNTRY THROUGH THE MINTAKA PASS

This is one of the two passes into Chinese Turkestan. Crossing it in April, when the snow lies deep, is laborious work, owing to the altitude, 15,430 feet. Once over it, however, the descent to the Pamir is down a valley where snow melts early in the spring. Ovis poli, though scarce in the Chinese Pamir region, were abundant in Russian territory (see, also, text, page 381).



YAKS CONQUER THE STEEP SLOPES AND DEEP SNOWS OF THE OVIS POLI COUNTRY

These uncouth beasts make it possible to hunt the elusive sheep in the high Pamir region early in the spring, while the deep snows remain and the sheep still retain their winter coats (see, also, text, page 375). They are slow, but remarkably sure-footed, and easily negotiate places where horses are useless.



THIS KIRGHIZ SLAYS MANY AN OVIS POLI WITH HIS MATCHLOCK

These antique weapons shoot a crude lead slug. Their limit for accuracy is about 50 yards. Though increasing numbers of modern breech-loading rifles are now coming into the Pamir region from Russia, the central Asian natives, no matter what type of gun they possess, always equip them with a forked rest near the muzzle. The rest supports the gun when fired from a prone, kneeling, or sitting position (see text, page 387, and illustration, page 382).

the forests and bush-covered areas of much of the central Tien Shan region, the bucks carrying horns averaging 15 inches in length, longer than those of the European variety or of races of other parts of Asia. Success was once more with us, for we collected a complete series of them.

When excited or alarmed, the illik barks much like a dog. One night we heard an excited barking on the near-by mountain; our men said that it was an illik which had seen the camp fire and was voicing his protest. Not having heard it before, we were skeptical, as there were dogs in a neighboring native camp. But later we saw both bucks and does give the bark, which at a distance can hardly be distinguished from that of a small dog (p. 403).

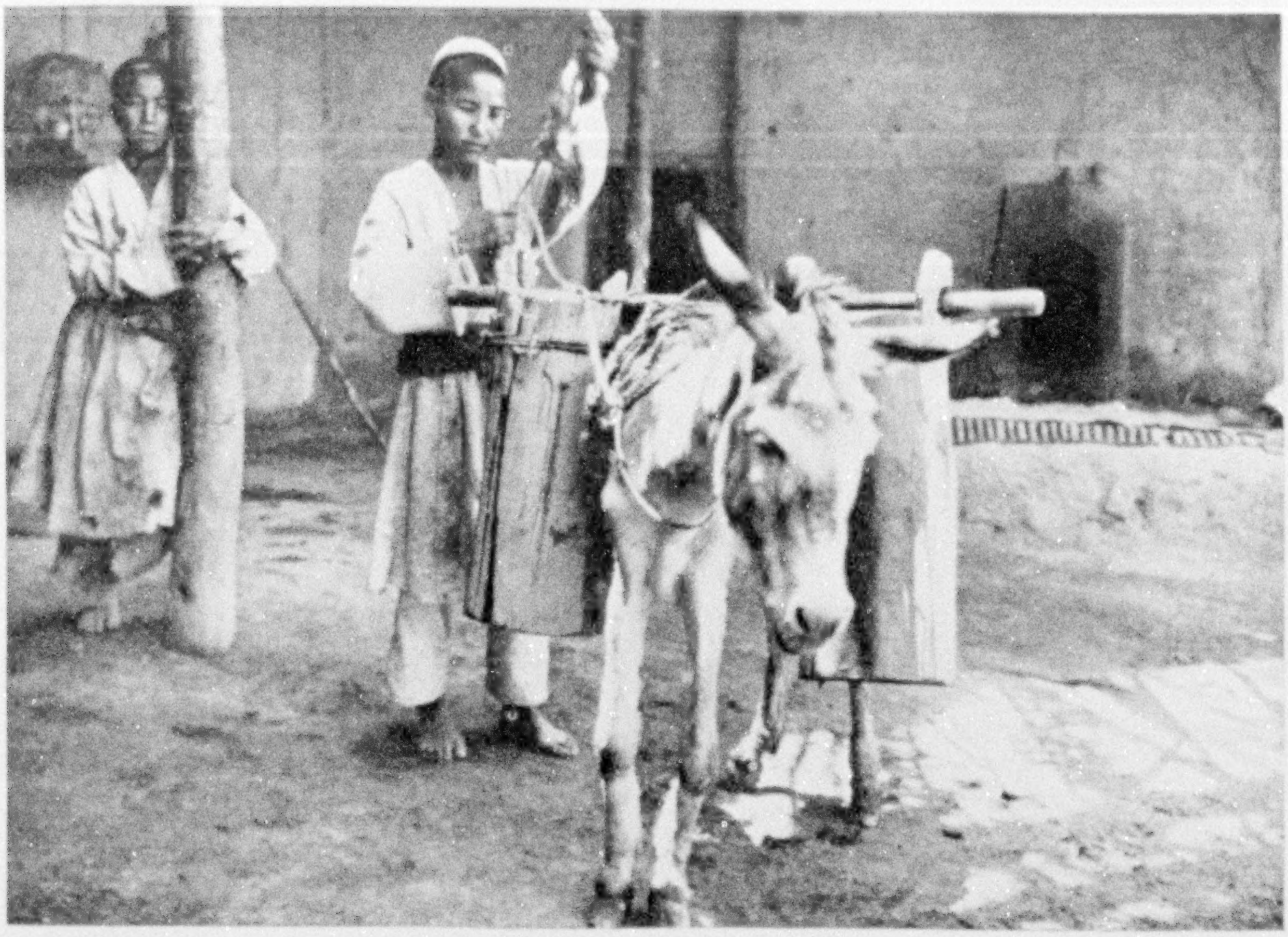
We made our way on down to the beautiful wide valley of the Tekes River, which runs for 100 miles between the northern and southern ranges of the Tien Shan. At a small Chinese post we were furnished an escort of five soldiers, who remained with us during our stay in the mountains. Though unnecessary for protection, they were accorded as the usual courtesy given to accredited white travelers through that section.

Now we pushed on as rapidly as possible eastward down the Tekes to reach the valley of the Kok-su River, where we were to hunt ibex. This brought us into the country of the Kazaks.

These people are closely akin to the Kirghiz and have a slight Mongol strain, though they are usually fair in complexion; many are even blue-eyed. We passed several Kazak villages in the Tekes, collections of small log-and-mud buildings amid irrigated fields (see, also, page 412).

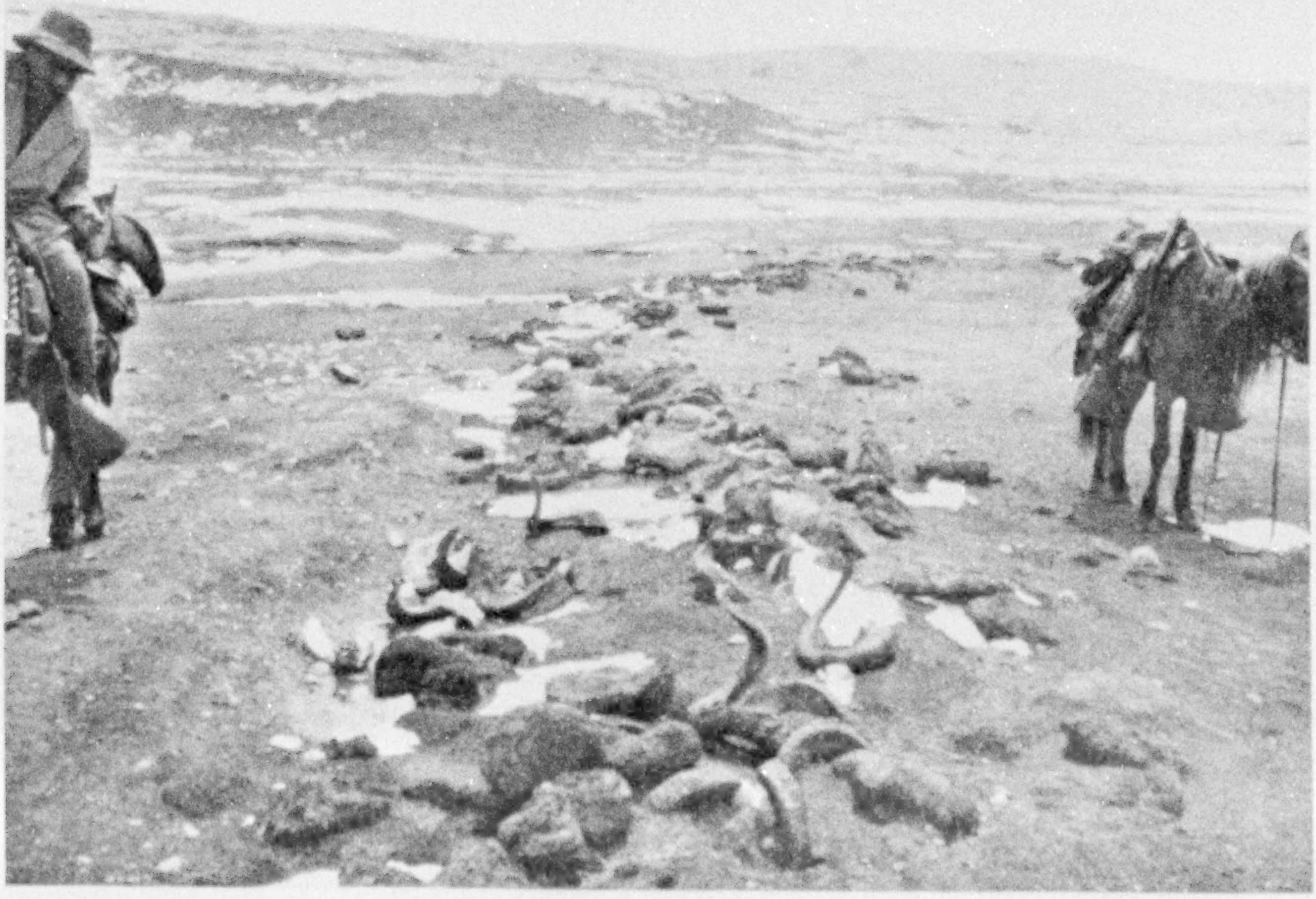
In the main, however, Kazaks are pastoral and live in yurts while following their flocks and herds. They are fond of kumiss, or fermented mare's milk, and drink large quantities of it.

Kazaks are Mohammedans, though I do



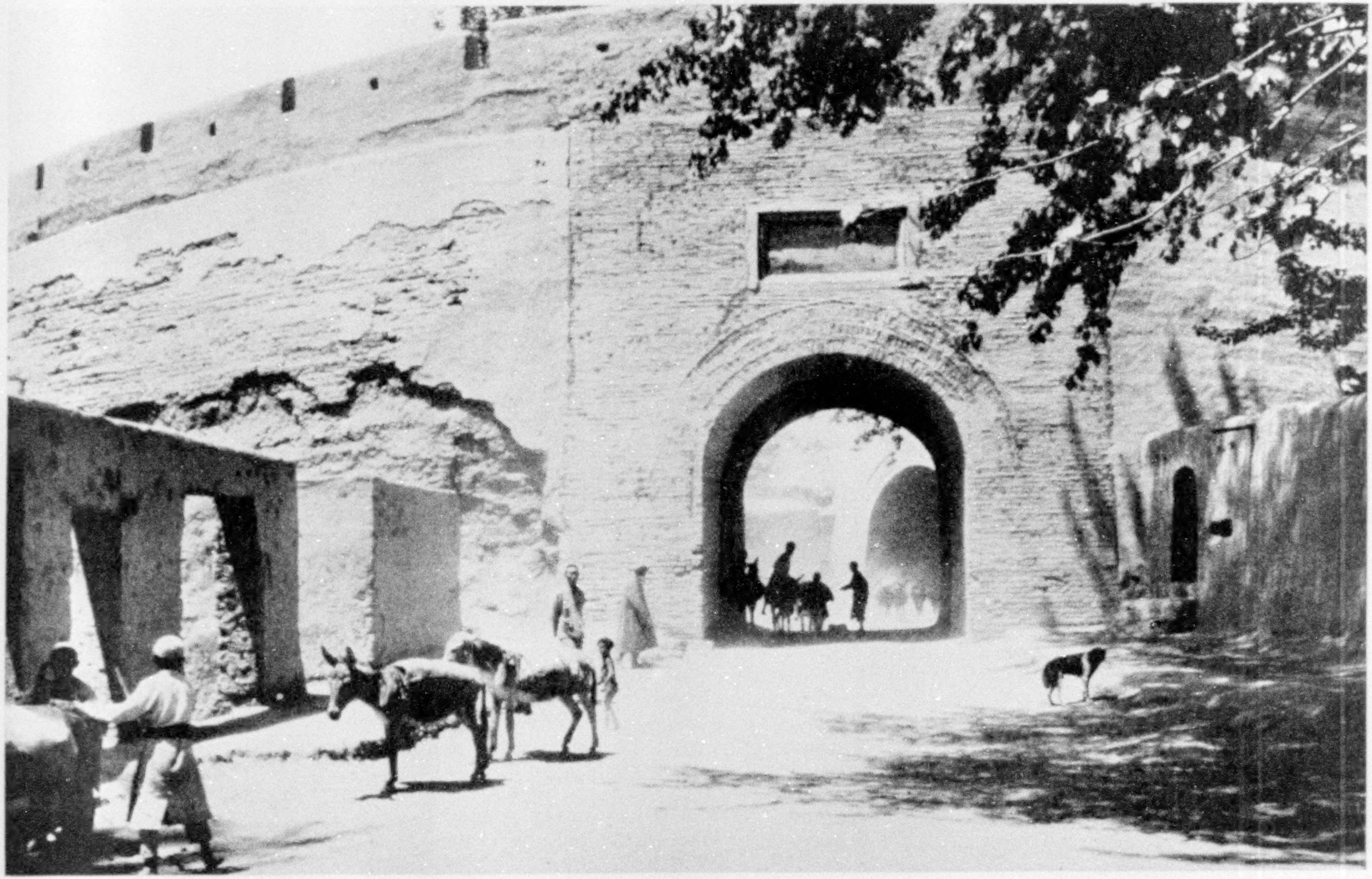
A PERAMBULATING COOLIE COOLER

The water vessels are made from hollowed logs or hewn slabs. Practically all of Kashgaria is a desert, and during the dry season water must be brought from distant points.



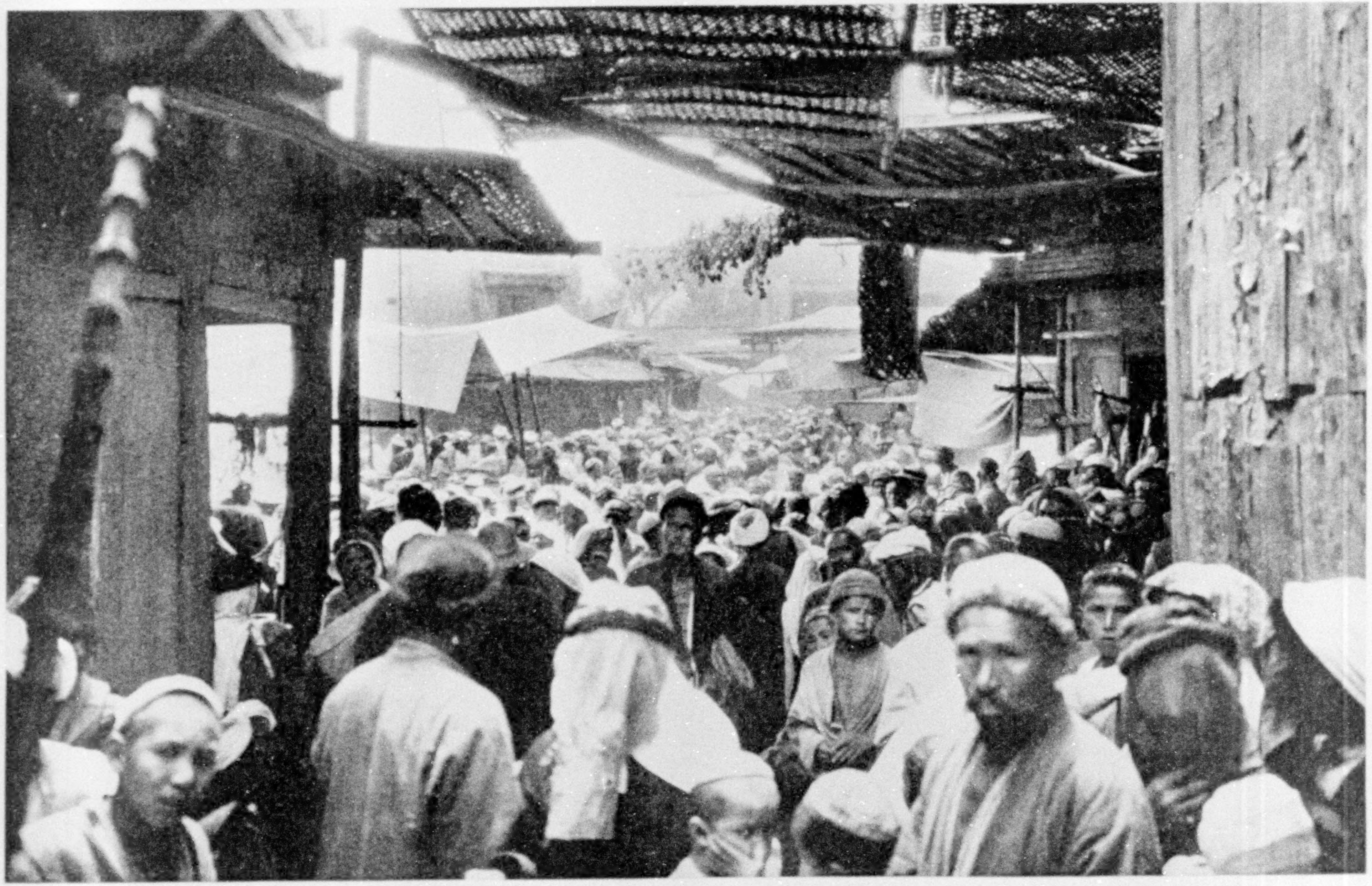
THE AFTERMATH OF A KIRGHIZ DRIVE ON THE OVIS POLI

The numerous old heads and horns of Ovis poli which lay about the valleys in Russian territory belonged to animals shot by the Kirghiz for food (see text, page 393).



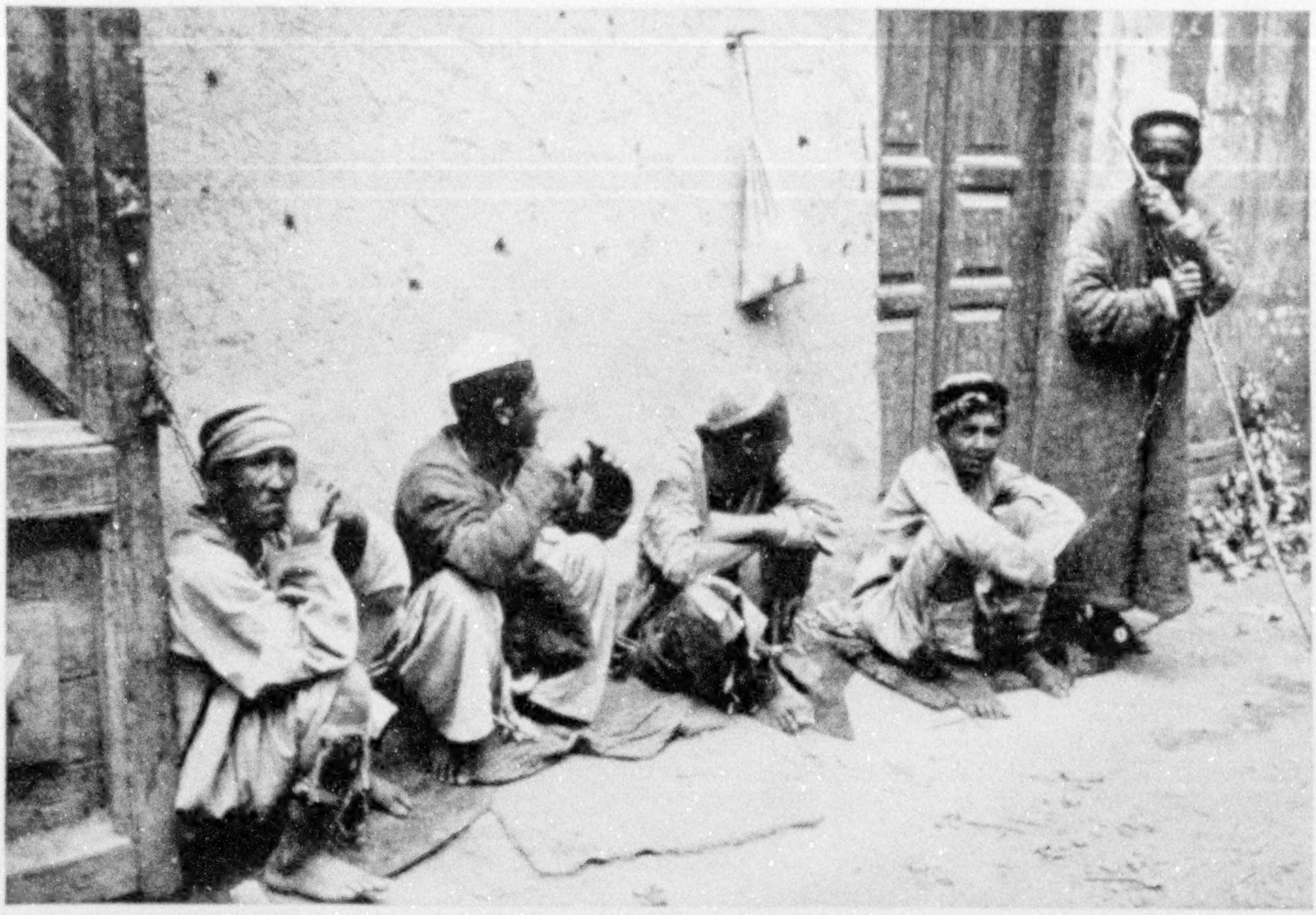
MARCO POLO PRAISED KASHGAR AS "THE GREATEST AND FINEST" OF SINKIANG'S CITIES

Nearly every Chinese city in the New Dominion is surrounded by a wall. The gates are always double, sometimes treble. The outer gateway leads into a courtyard commanded by loopholes and embrasures; a second, usually at right angles to the first, admits to the inside of the wall. The third gate, if there be one, opens into another courtyard.



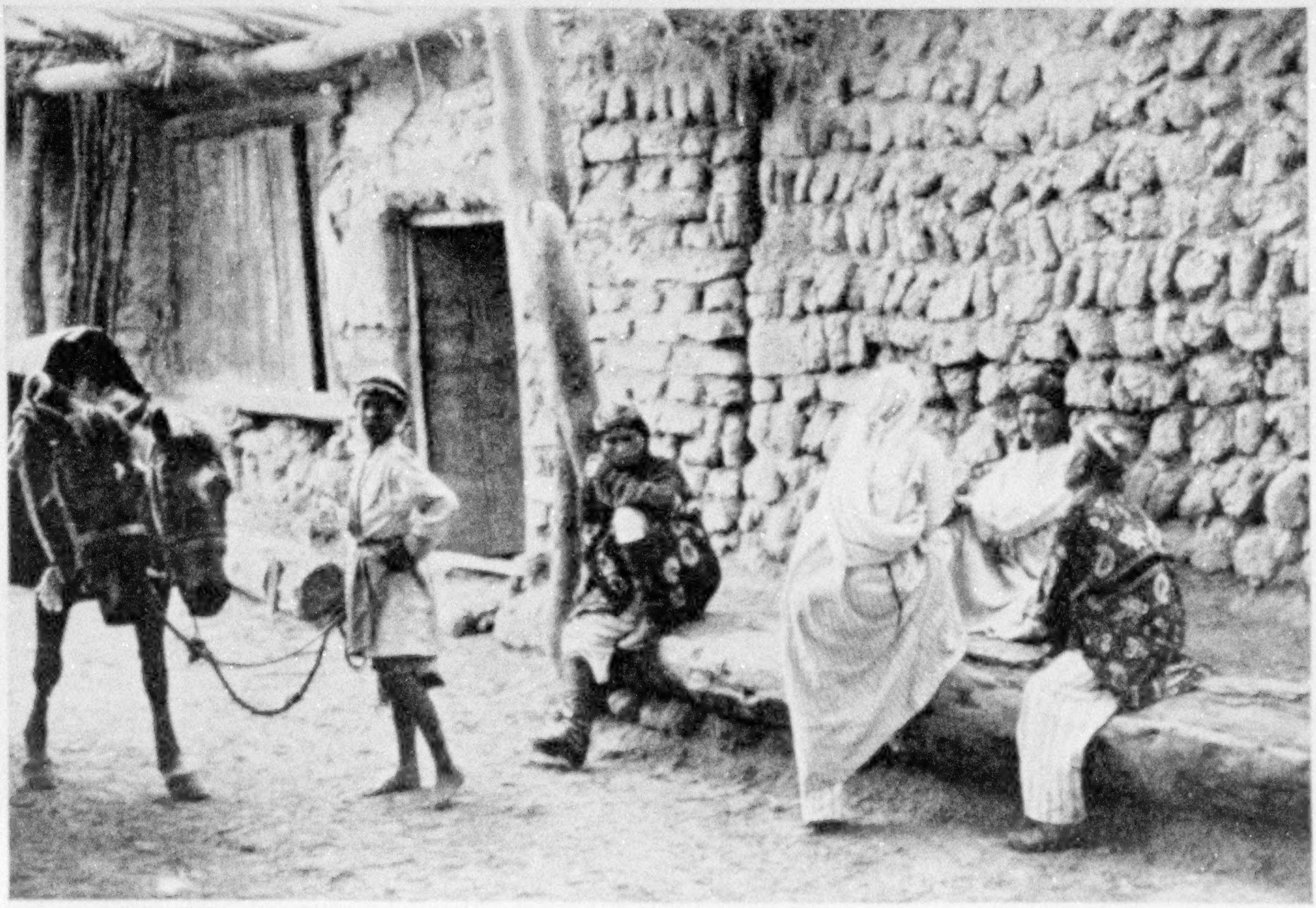
THURSDAY IS THE BIG DAY AT KASHGAR'S BAZAARS

Country people from miles around crowd into the city to buy and sell. "The inhabitants live by trade and handicrafts," said Marco Polo of them in his time; and this is true to-day. The bazaars display native saddles, hardware, fur-trimmed caps embroidered in gold, jade snuff bottles, old tin cans, daggers, copper jugs, altar ornaments, roast ears of corn, unleavened bread, and chunks of roast skewered mutton. The bazaars are often roofed with matting or brush as a protection against the broiling midday heat.



PRISONERS AT THE CITY GATE: KASHGAR

They are not fed by their captors, but are chained outside to beg their food. In general, punishment in the New Dominion follows the Chinese system. Mutilation is no longer practiced.



THE QUIET LIFE IN A VILLAGE OF KASHGARIA

Kashgaria region is that part of Chinese Turkestan which lies between the Karakoram-Kuenlun ranges on the south and the Tien Shan on the north. The inhabited areas are oases.

DWELLERS IN THE LOW PLACES

These Turki women live in the Turfan Depression (see, also, text, page 409, and illustration, page 418). They are a sedentary people, probably of Aryan stock mixed with alien blood.

not believe that polygamy is common among them. We heard of an interesting custom while passing through their country. When the head of a family dies, his wife holds a field day, at which there are horse races. The first prize is one of the horses that belonged to the husband, the second a cow, the third a sheep, and the fourth a goat.

At one place our Chinese escort demanded that the Kazaks sell us 15 sheep for food. The natives refused and the officer in command of the soldiers ordered their headman arrested. The attempt precipitated a fight, 40 Kazaks assaulting our five soldiers.

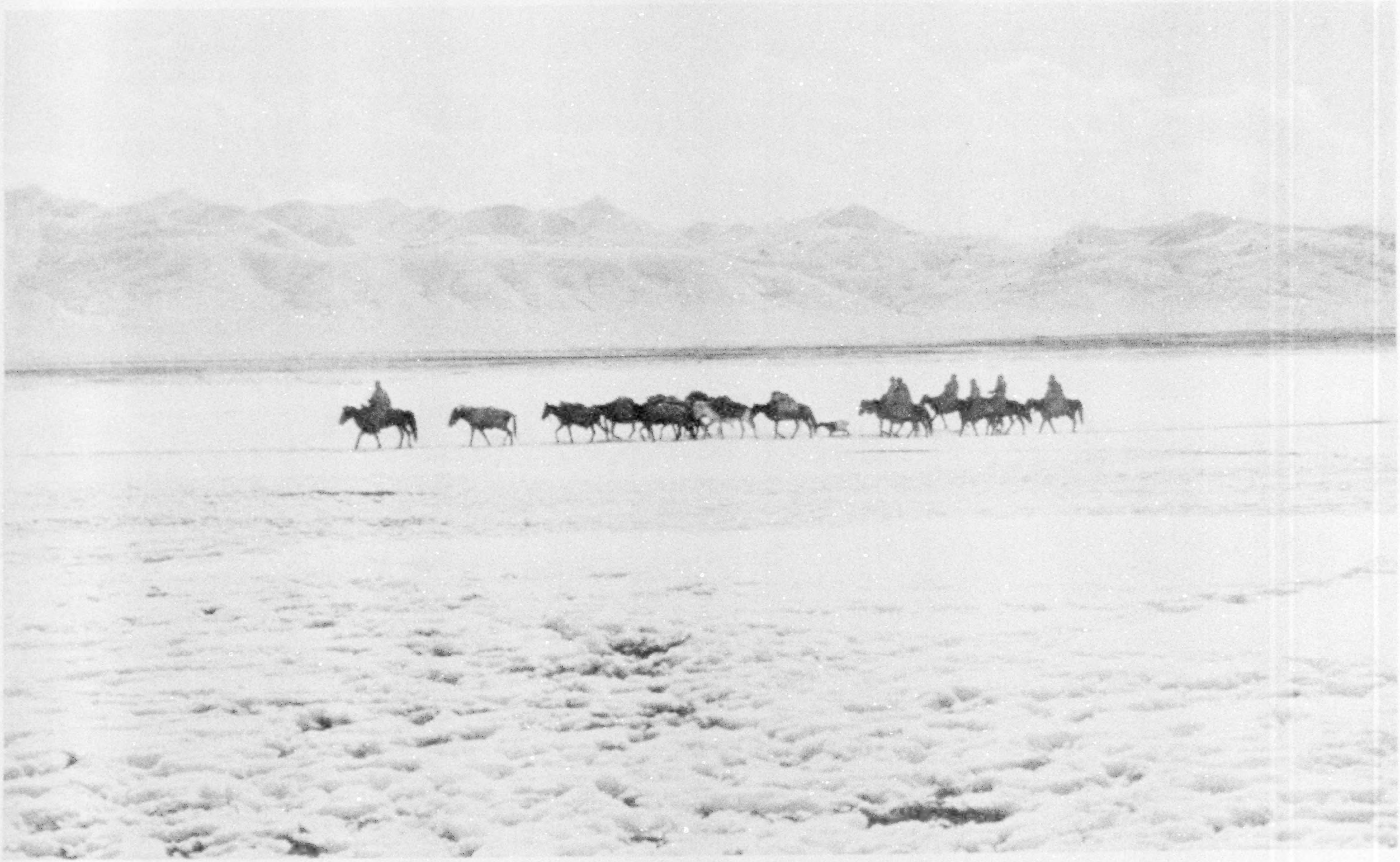
For a time it looked as though we were in the midst of a native uprising, but after two or three soldiers were badly beaten, we managed to quiet the frenzied mob, and held a small durbar, or council, at our tents. The natives first flatly refused to sell any sheep, but later offered to let us have as many as we wished. As they had an exaggerated idea of their value, however, we refused to buy and obtained sheep from another encampment the next day. We reported the assault to the nearest Government post, and later learned that the leaders of the Kazaks were arrested by Chinese authorities and imprisoned for several months.

Our march now led steadily eastward across rolling upland grass country until we reached the ibex hunting ground, the Kok-su Valley. For the last part of the journey we had seen, off to the south, high rocky peaks with forested lower slopes which our guides told us were the homes of ibex.

IBEX CLIMB CLIFFS AT AMAZING SPEED

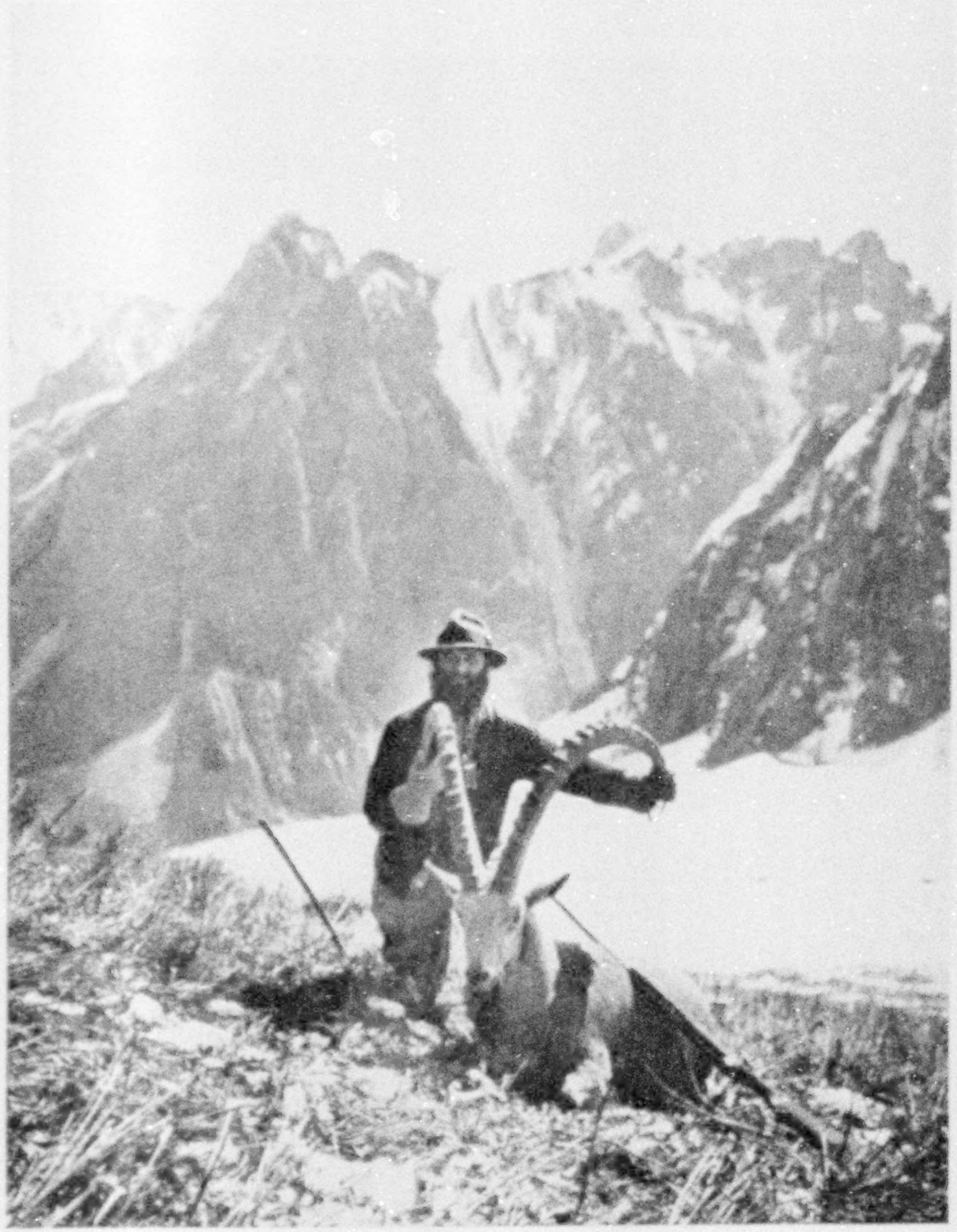
It was difficult-looking country, and so it proved to be. Ibex are at home among crags and sheer rock cliffs, so that hunting them entails hard work. One leaves camp in the early hours of the morning, often at 2 or 3 o'clock, and climbs from 2,000 to 4,000 feet to reach a point of vantage before the animals seek the higher fastnesses, where they halt for their midday siesta.

These altitudes average 10,000 to 13,000 feet. Though they are not high as in the



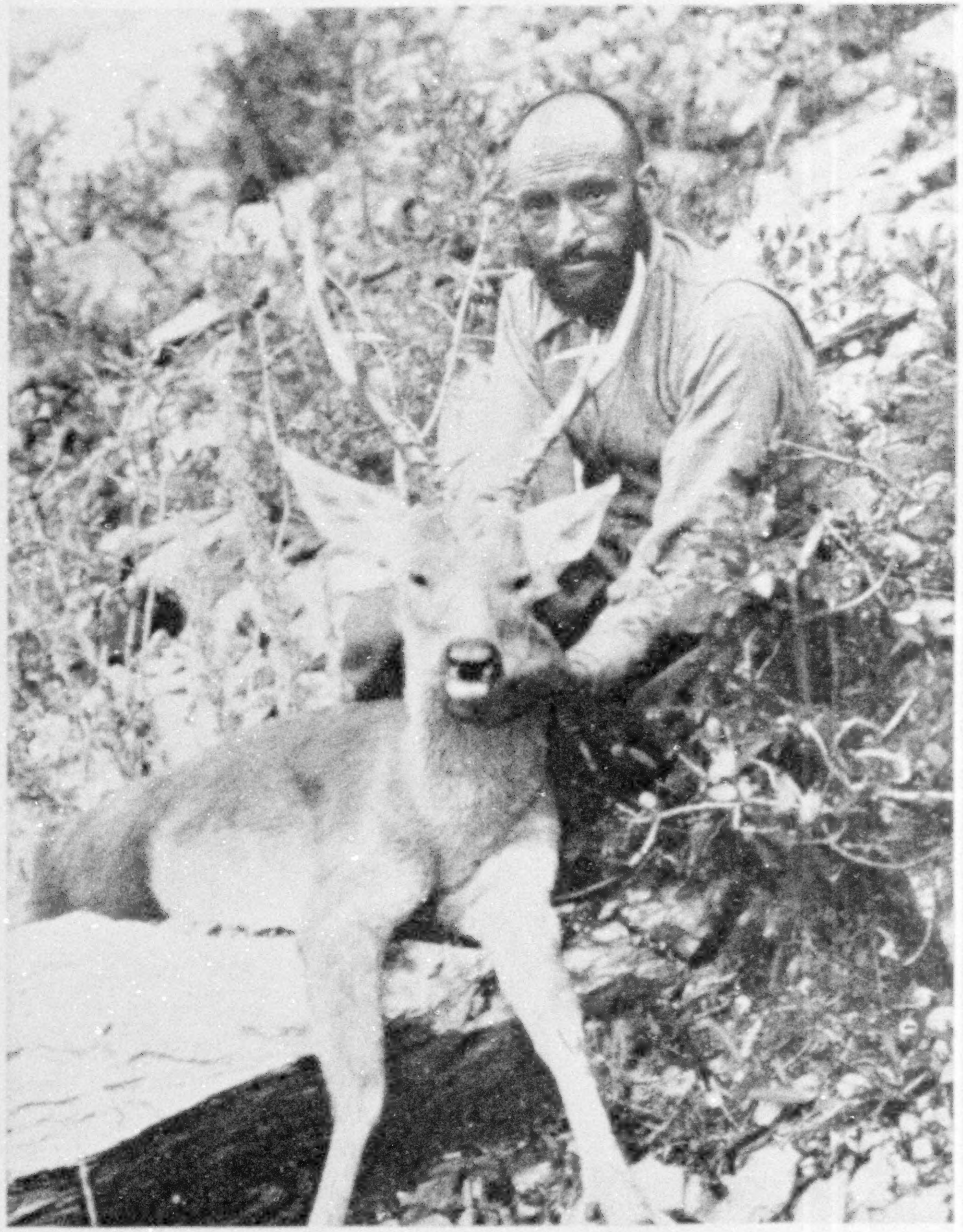
A SILHOUETTE AGAINST THE SNOWS OF THE YULDUZ VALLEY

This depression extends for more than 100 miles, between the Khaidu Tagh and the more northerly ranges of the Tien Shan. Many Torguts, remnants of a once numerous Mongol tribe, are found here (see, also, illustration, page 414).



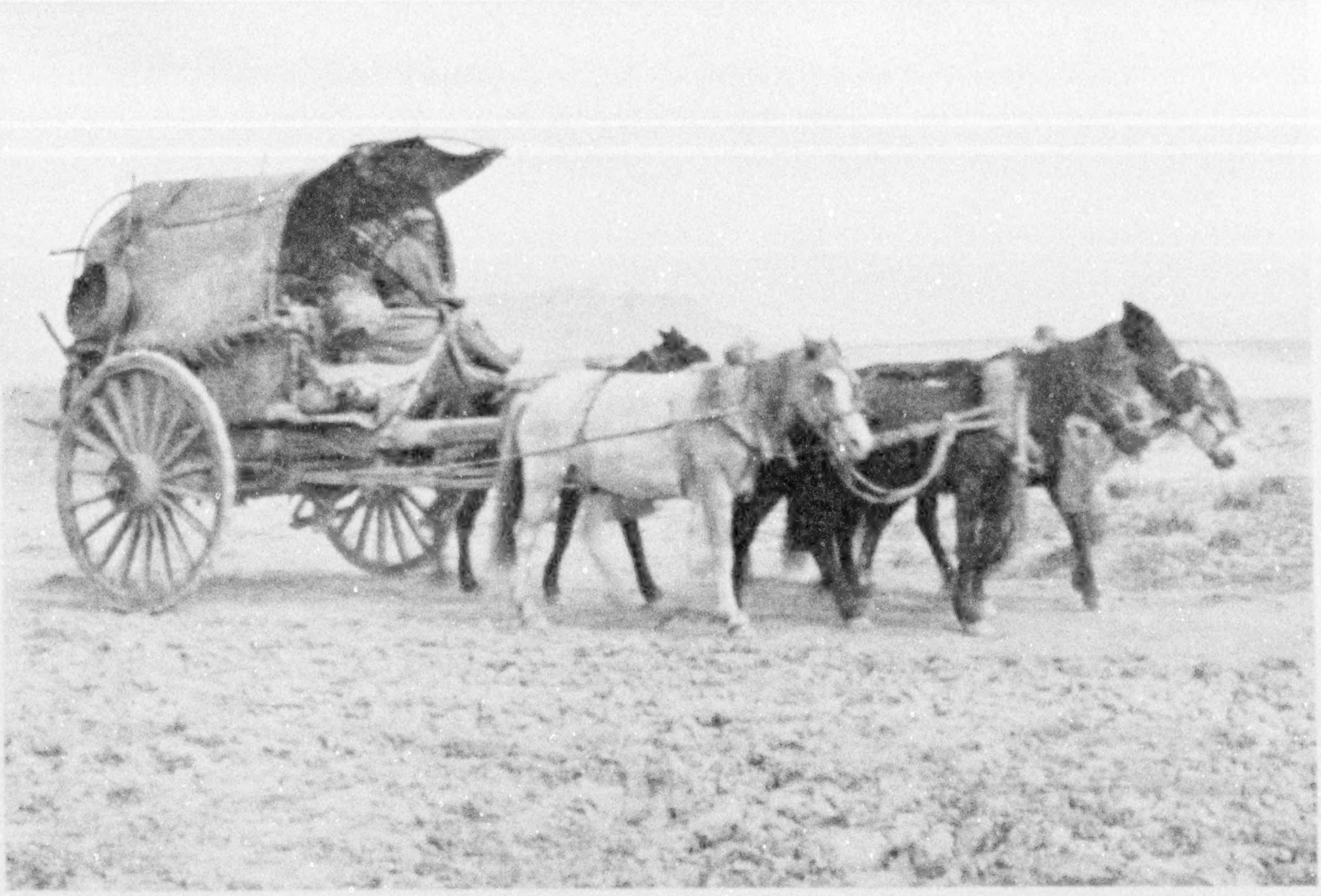
SCIENCE OBTAINS A TIEN SHAN IBEX

The expedition collected a series of these members of the goat family from the Kok-su Valley (see map, page 374). They lived in precipitous, broken country, at altitudes ranging from 10,000 to 13,000 feet, and hunting them entailed hard climbing (see, also, text, page 401).



THIS DEER BARKS LIKE A DOG

The *illik*, or Tien Shan roe deer, roam the bushy and forested areas of the Tekes and Kok-su regions. When excited or alarmed, they give a bark which can hardly be distinguished from that of a small dog. They bound away from their enemy on their long legs with amazing speed.

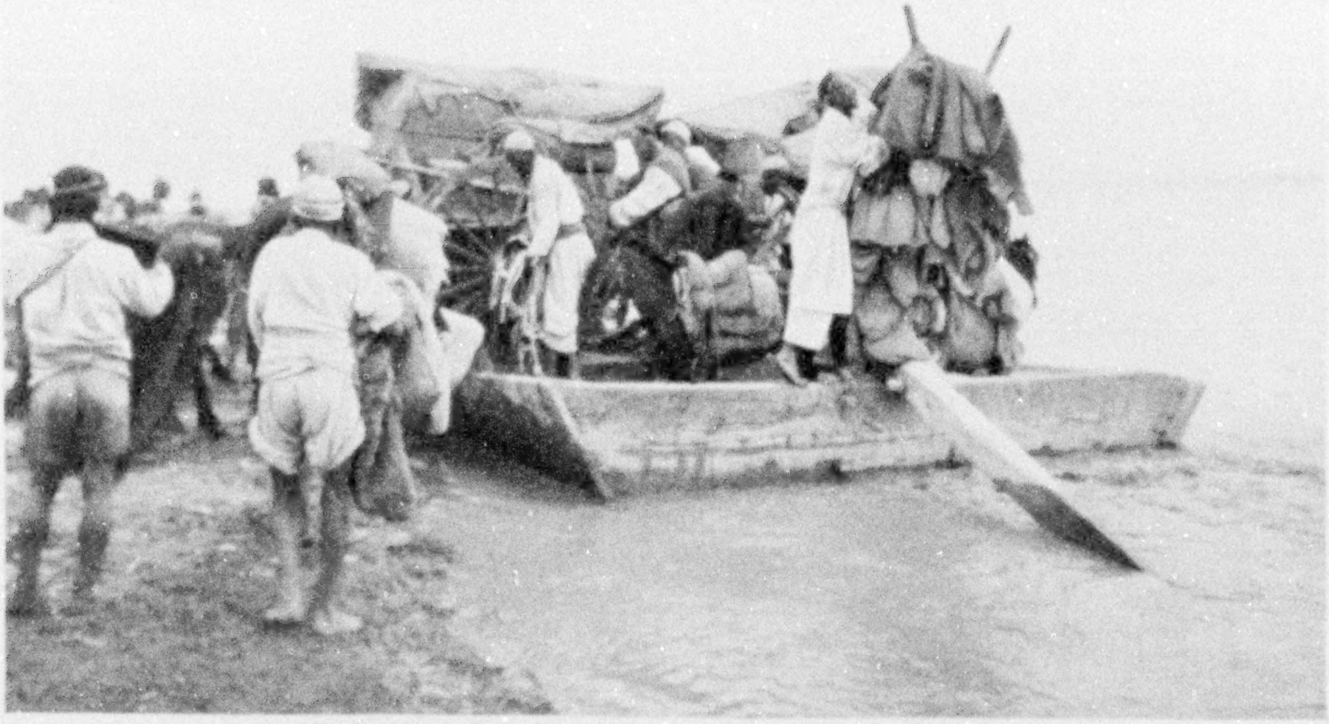


THE "ARABA" IS THE HEAVY-TRANSPORT VEHICLE FOR SINKIANG

From two to five horses pull these slow carts. If five are used, loads are well balanced over the axle, so that the wheel horse between the shafts carries little weight.

THE KALMUCKS WERE IMMORTALIZED BY DE QUINCEY

In his "Flight of a Tartar Tribe," the English author described the 8-month trek of the Kalmucks in 1771, from the Volga River, in Russia, to the Tien Shan region, in Chinese Turkestan, during which they suffered many vicissitudes.



LOADING "MAPAS" ON A FERRY OVER THE AKSU RIVER

The craft, usually a crudely built, 30-foot scow, is pushed into the current. With the aid of two planks, used as oars in the bow, it floats downstream to a landing on the far shore. For the return trip it is dragged upstream above the opposite landing point (see, also, illustration, page 413).

Pamir, the steepness of the country fully compensates for the difference in elevation.

We observed the remarkable ease with which ibex traversed seemingly impassable places at full speed. On one occasion, while lying concealed on a ridge, watching a band of ibex in a valley far below, we became aware of a herd of females and young which had approached from the other side. As they could not see us, we remained quietly watching their movements.

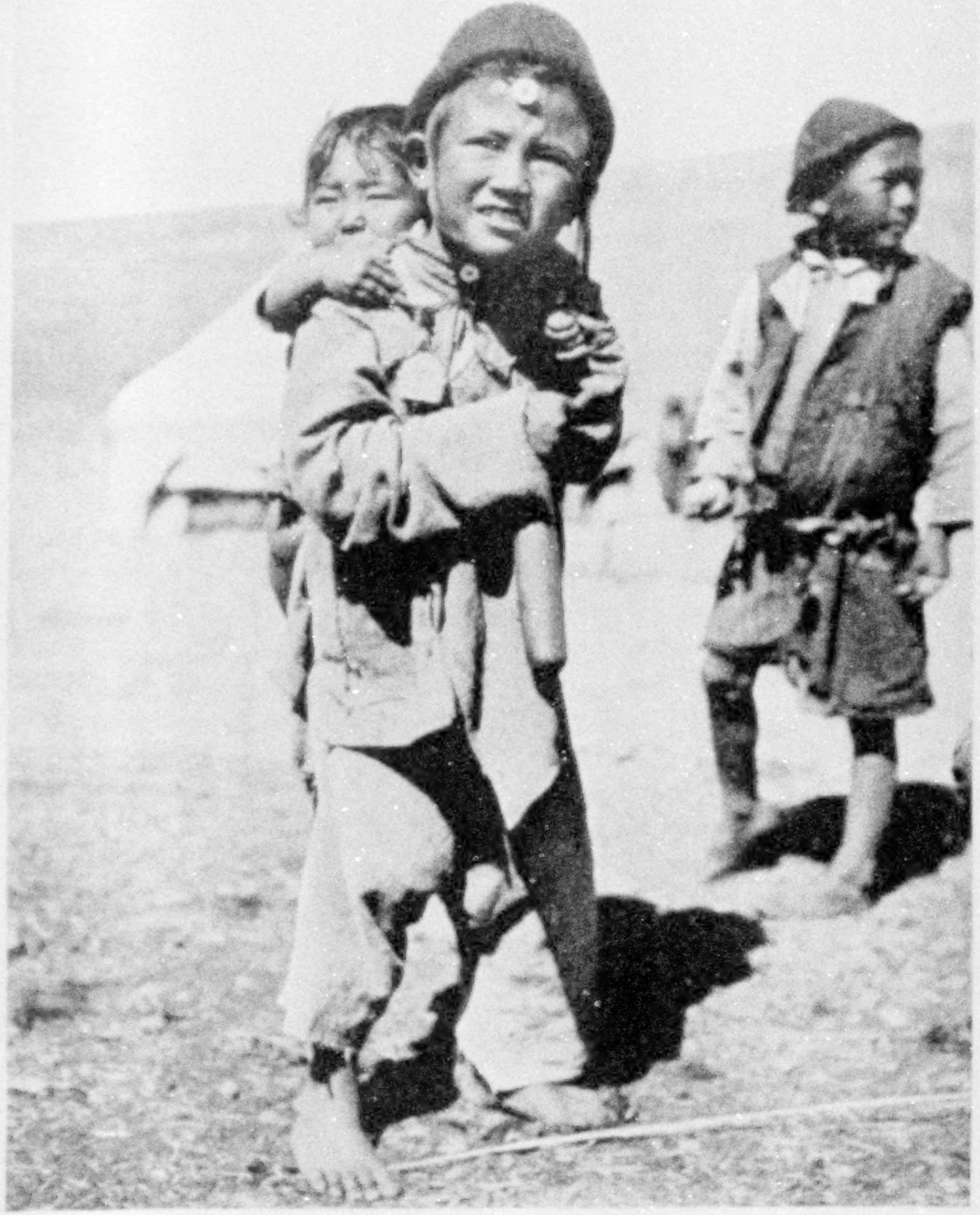
They walked slowly upward until they arrived among broken rocks 50 yards to our right. Suddenly a swirl of wind carried our scent to them. An old "nanny" whistled the alarm signal and the whole herd dashed madly uphill. They turned across a cliff face at top speed without pausing to look ahead, leaped over yawning chasms and sent bowlders crashing down almost upon us. It seemed as though they were literally sticking to the side of the rock. None fell, though we expected to see at least one of the younger "kids" tumble headlong.

We obtained a complete series of ibex (*Capra sibirica*), from large males to young kids, the great scimitar-shaped horns of the former making impressive additions to the Museum's collections. But now winter was fast approaching, so we had to quit that beautiful country (see illustration, page 403).

WIND AND WATER CARVED A MEDIEVAL CITY

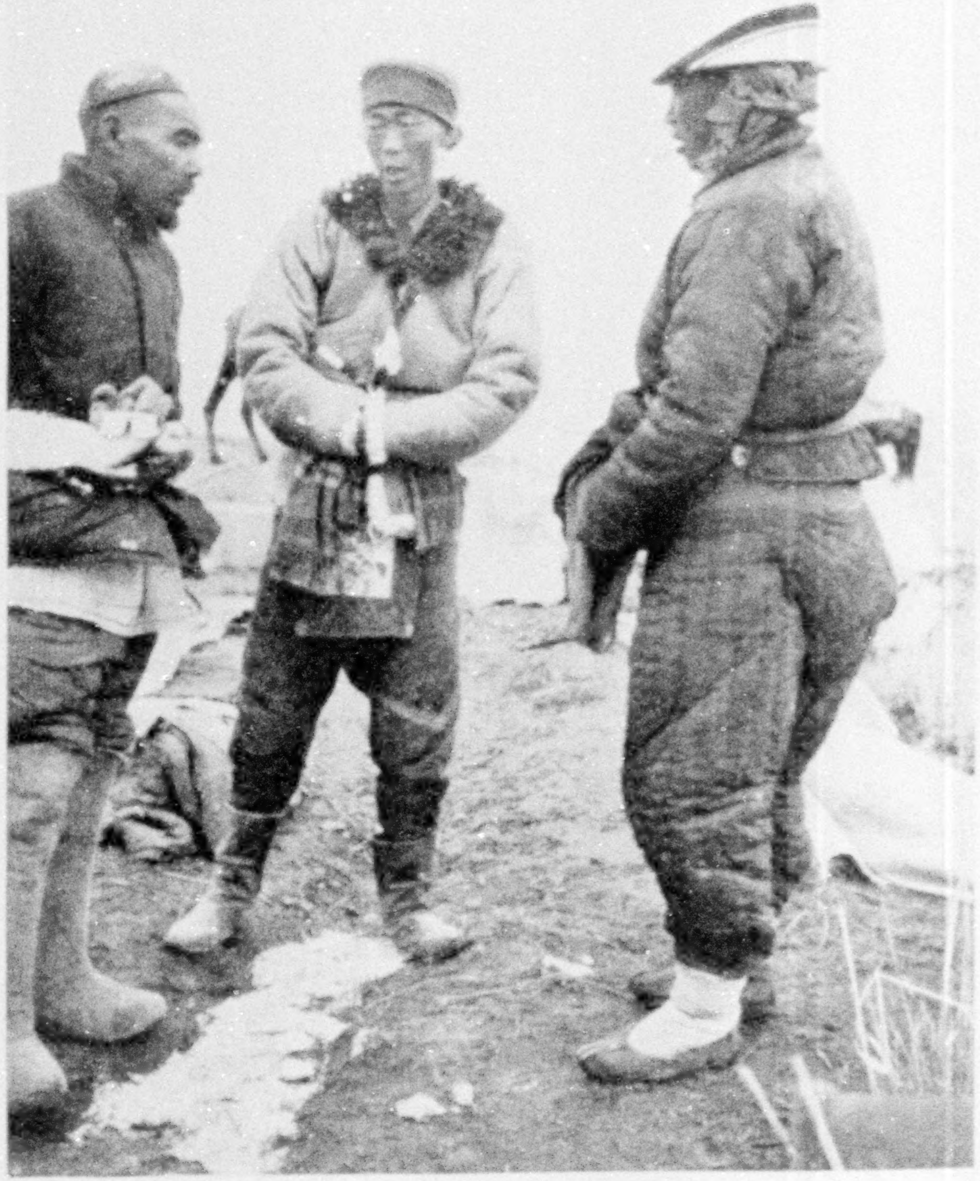
On the way out to the Yulduz Valley, which took us down again onto the plains, we passed a formation known in Turki as *Kargai Tash.* Literally translated, it means "Trees of Stone," and from a distance it does look much like a mountain covered with a scattered growth of pine forest. From other directions it looks like a medieval city, with walls, spires, turrets, and buttresses extending over a long hilltop. The formation is of sandstone, eroded by wind and water, and is known to the natives for many marches to the west (see illustration, page 410).

Before reaching the Yulduz we hunted another wild sheep (*Ovis littledalei*), found



LITTLE HERDERS OF THE CELESTIAL MOUNTAINS

Their Kalmuck fathers are nomads who follow the herds of cattle and horses, which in summer are pastured in the grassy valleys of the Tekes (see illustration, page 411) and the Yulduz (see illustration, page 402). Unlike most of the tribes in central Asia, the Kalmucks wear pigtails.

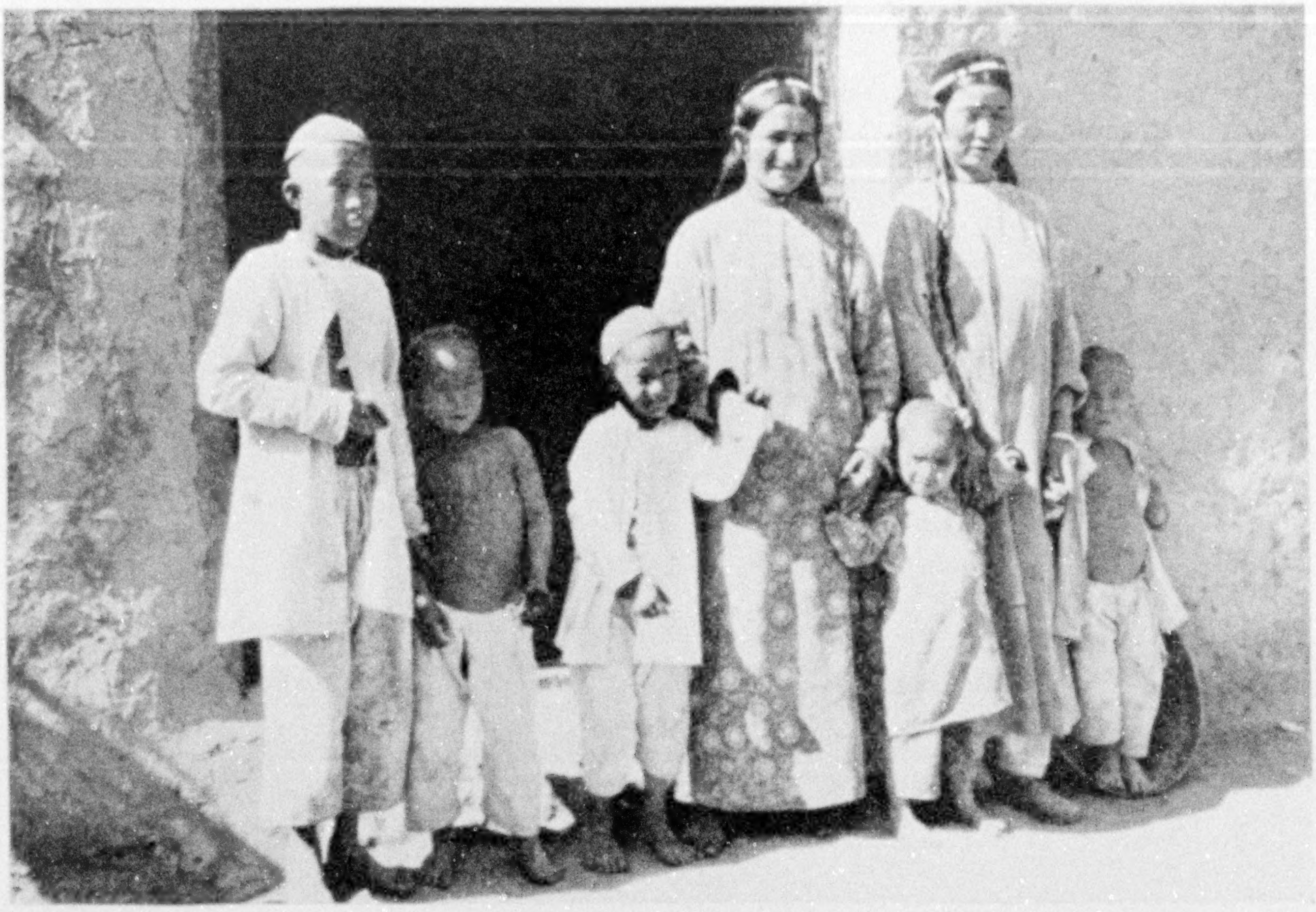


MOHAMMED RAHIM CHATS WITH THE CHINESE ESCORT

The cook, interpreter, and general handy man (left) was an Aryan-Ladakhi, who became a faithful and useful member of the expedition. His knowledge of Chinese, as well as other languages, saved the scientists from a shooting party (see, also, text, page 429).

IT TAKES TWO BARBERS TO A "CHAIR" IN TURKESTAN

KAZAK MOTHERS AND THEIR YOUNG HOPEFULS



POSING FOR THEIR FIRST PHOTOGRAPH

These Turki women darken their eyebrows, carrying the "make-up" across the bridge of the nose, which gives them a peculiarly level-browed appearance.

KALMUCK WOMEN OF THE TEKES VALLEY FLUFFING WOOL

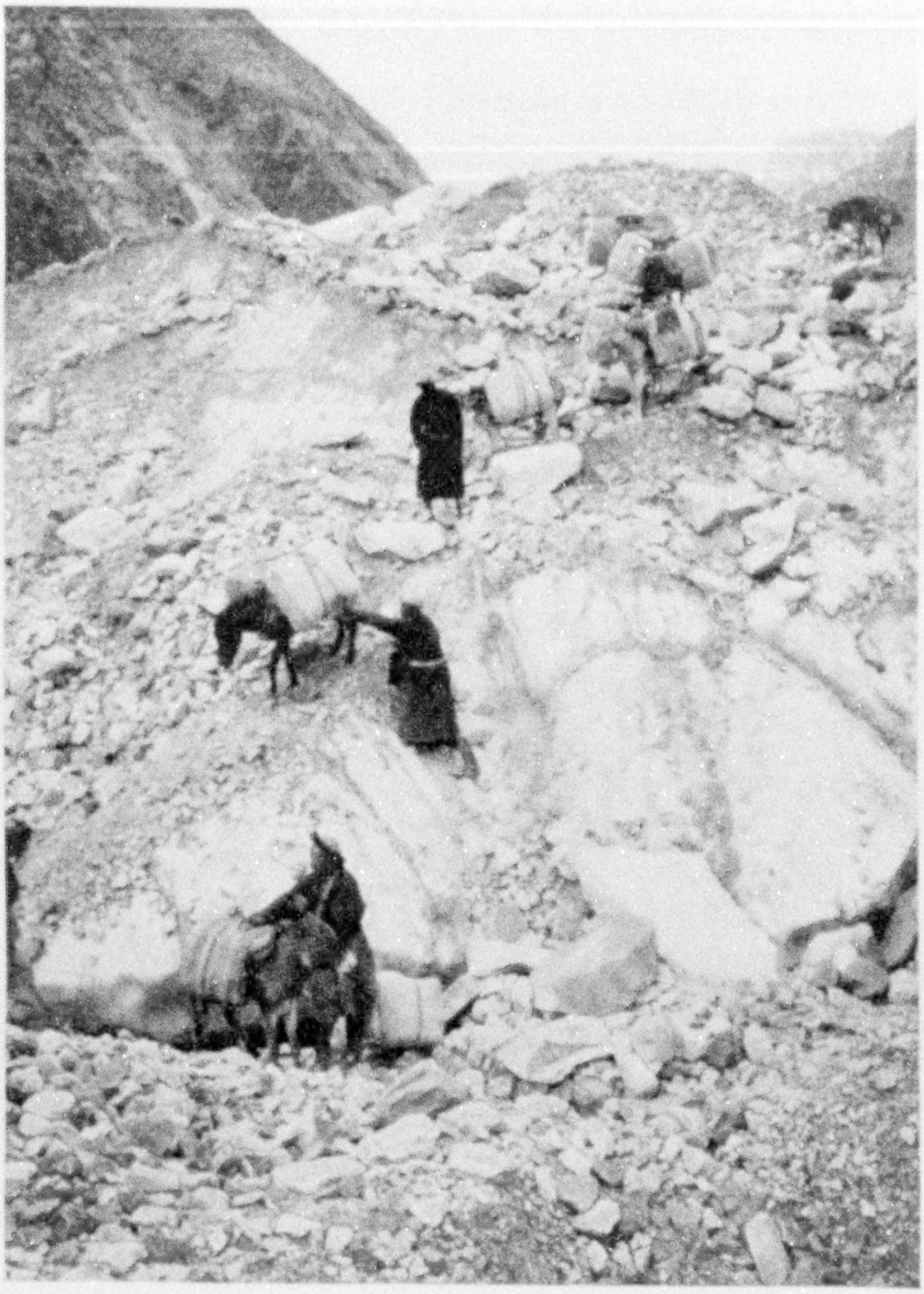
After it is spread on a cloth and beaten with light rods to make it fluffy, the wool is respread on other cloths, with the wisps roughly parallel. Water from skin bags is sprinkled over it and the whole mass rolled around a pole and left to soak. The rolling compresses the wool into coarse felts, known as *numdahs,* used for yurt coverings, rugs, boots, and blankets.

near Kargai Tash and in the *mullahs,* or valleys, on either side. While we were camped in a mullah, a two-day snowstorm came down, covering the tiny shrubs and dung which had been our only fuel.

For three days we lived on canned beans, carried as emergency rations, and coffee made from dirty water obtained by melting snow over candles.

In the Yulduz we met another race, the Kalmucks, closely allied to the Mongols. Like Kirghiz, they are nomads and live in yurts, following flocks and herds to the best grazing grounds. Like Mongols and Tibetans, they are Lamaists, acknowledging the Living Buddha at Urga as the head of their church. The priesthood lives in lamaseries, one or two of which we passed along the way.

Much of the journey up the Yulduz was through snow, though once out of the valley a more moderate climate was encountered.



MUZART PASS MEANS DEATH TO MANY ANIMALS

The crossing is dangerous, for much of the way lies over the broken surface of the Muzart Glacier. Skeletons of horses, mules, and donkeys line the trail, and their broken legs or shoulders indicate the cause of their deaths (see, also, text, page 391).

Karashar, a small trading city just below the southern range of the Tien Shan, and another definite stage of the journey, was reached on September 21. Here kit and supplies were once more overhauled and repacked, as our Kashmiri staff turned back with the Tien Shan collection, and we continued east, again using mapas for baggage transport.

We bought horses for ourselves, and for our one remaining retainer, Mohammed Rahim (see, also, text, page 389). These animals were used until our arrival at Kobdo, Mongolia, two months later, a distance of 1,100 miles. Though jaded at the end of this journey, they had served us well.

THE TURFAN DEPRESSION IS THE SECOND LOWEST ON THE EARTH'S SURFACE

The route from Karashar to Tihwafu skirts the Turfan Depression, which, except for the Dead Sea Valley, is the deepest place on the earth's surface not covered by water.* Leaving the cart road, we crossed it to determine what composed the surface. The lower portions

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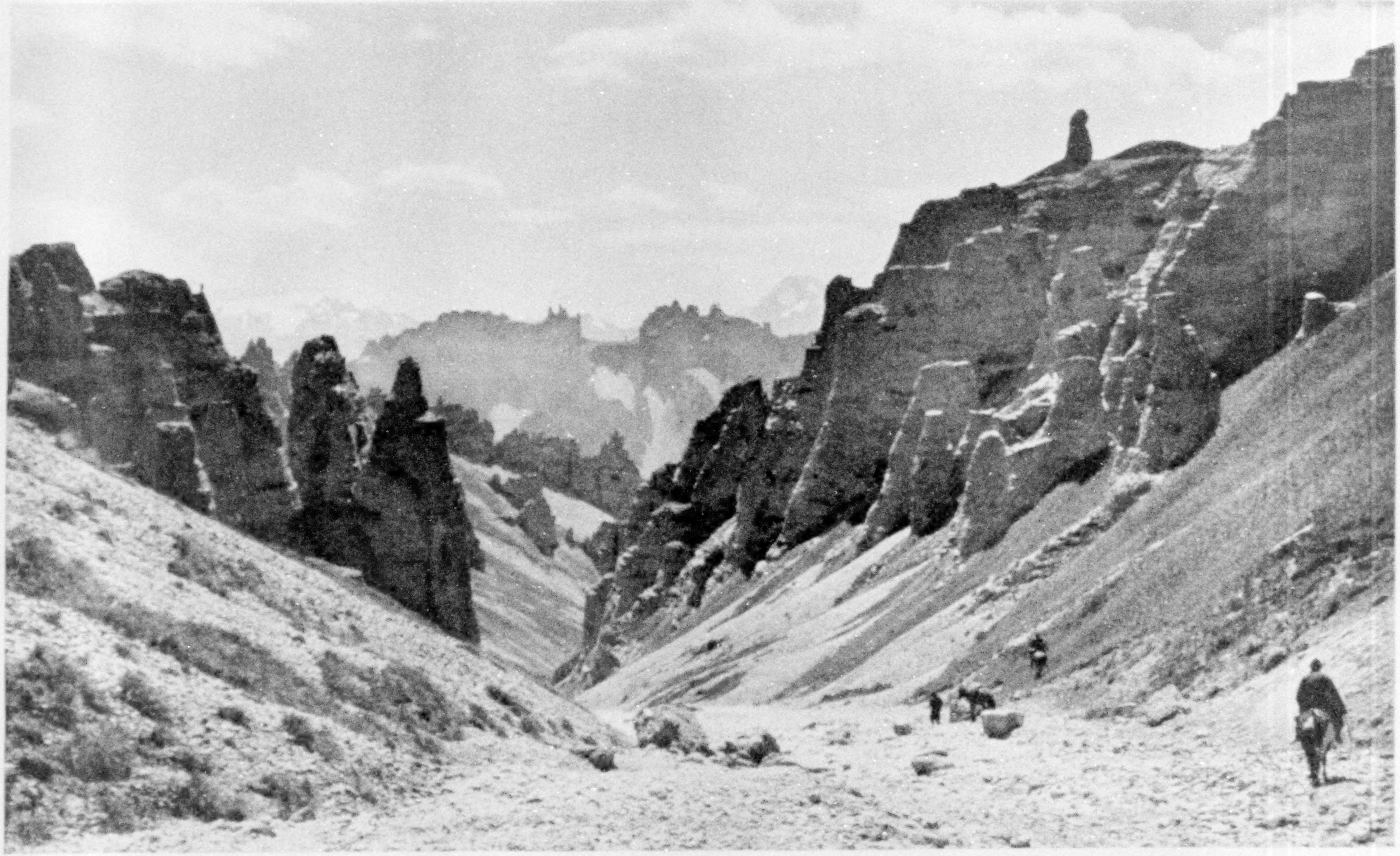
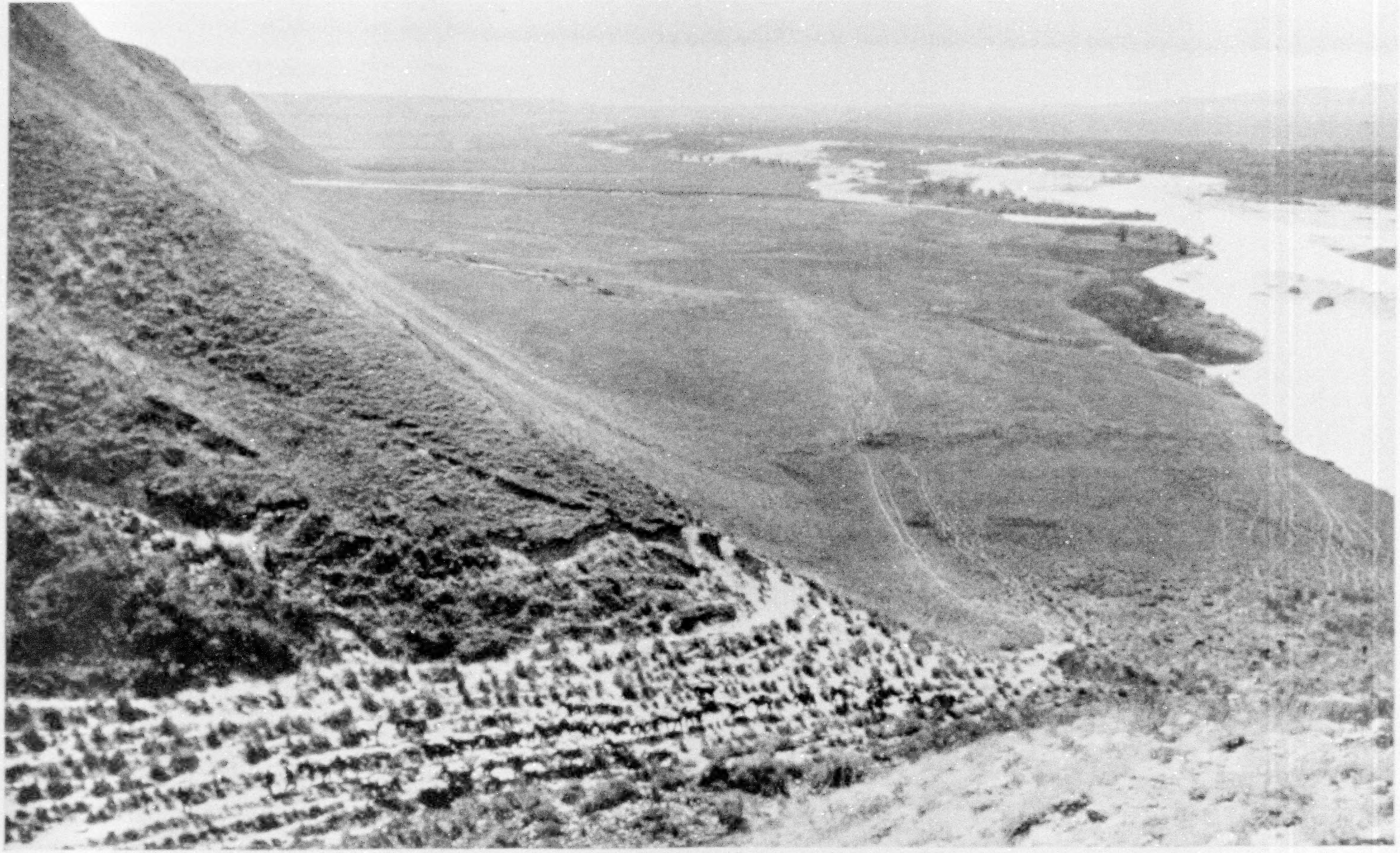
* See, also, "Flying Over Egypt, Sinai, and Palestine," by P. R. C. Groves and J. R. McCrindle, in the NATIONAL GEOGRAPHIC MAGAZINE for September, 1926.



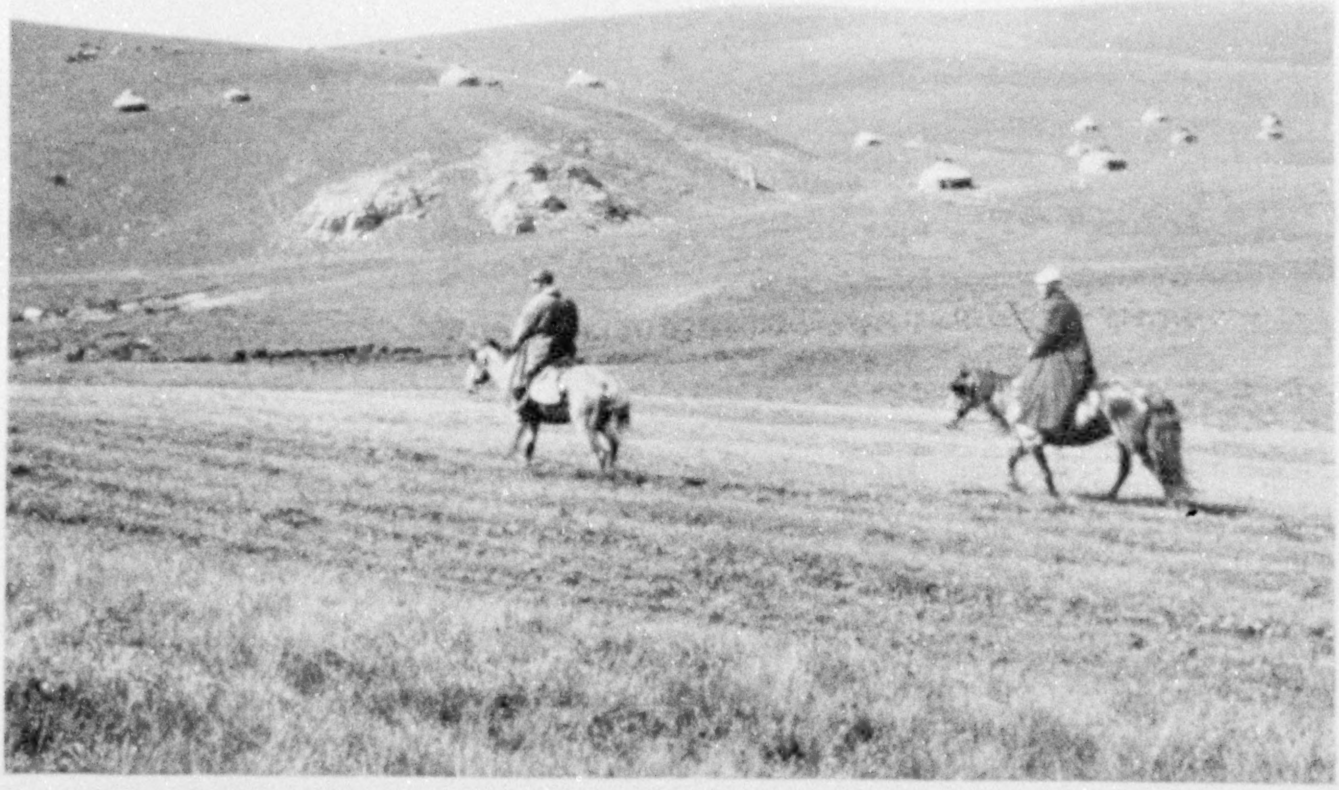
THE KARGAI TASH ARE "TREES OF STONE"

This peculiar formation, a flat-topped butte crowned with irregular "pencils of black rocks," resembles a mountain covered with a scattered growth of pine forest, when viewed from one direction; from another it looks like a medieval city, for wind and water have carved the sandstone into fantastic shapes. Ibex are found near it (see, also, text, page 405).

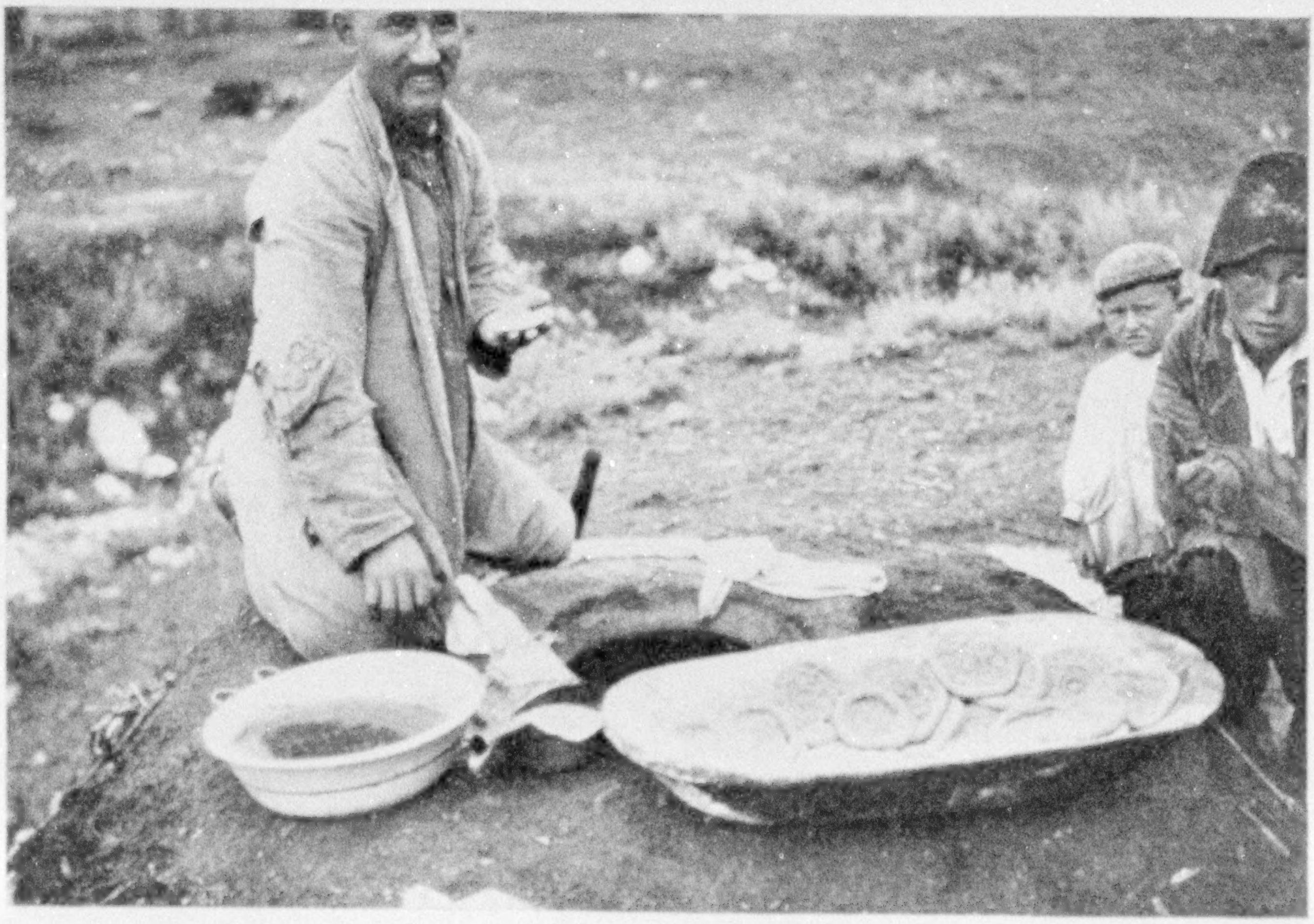


THE TEKES RIVER PLAIN IS AN UNBROKEN STRETCH OF SHIMMERING GRASS

This stream rises in the glaciers of the Tien Shan. Its valley extends 150 miles east and west between these mountains' northern and southern ranges. It is excellent grass country, watered by many streams flowing from the southern range. The northward-facing mountain slopes are heavily forested with pine and spruce. Its population is scant, being for the most part Kazaks, with a sprinkling of Kalmucks and a few families of Russian refugees. The expedition's caravan is climbing the slope in the left foreground.

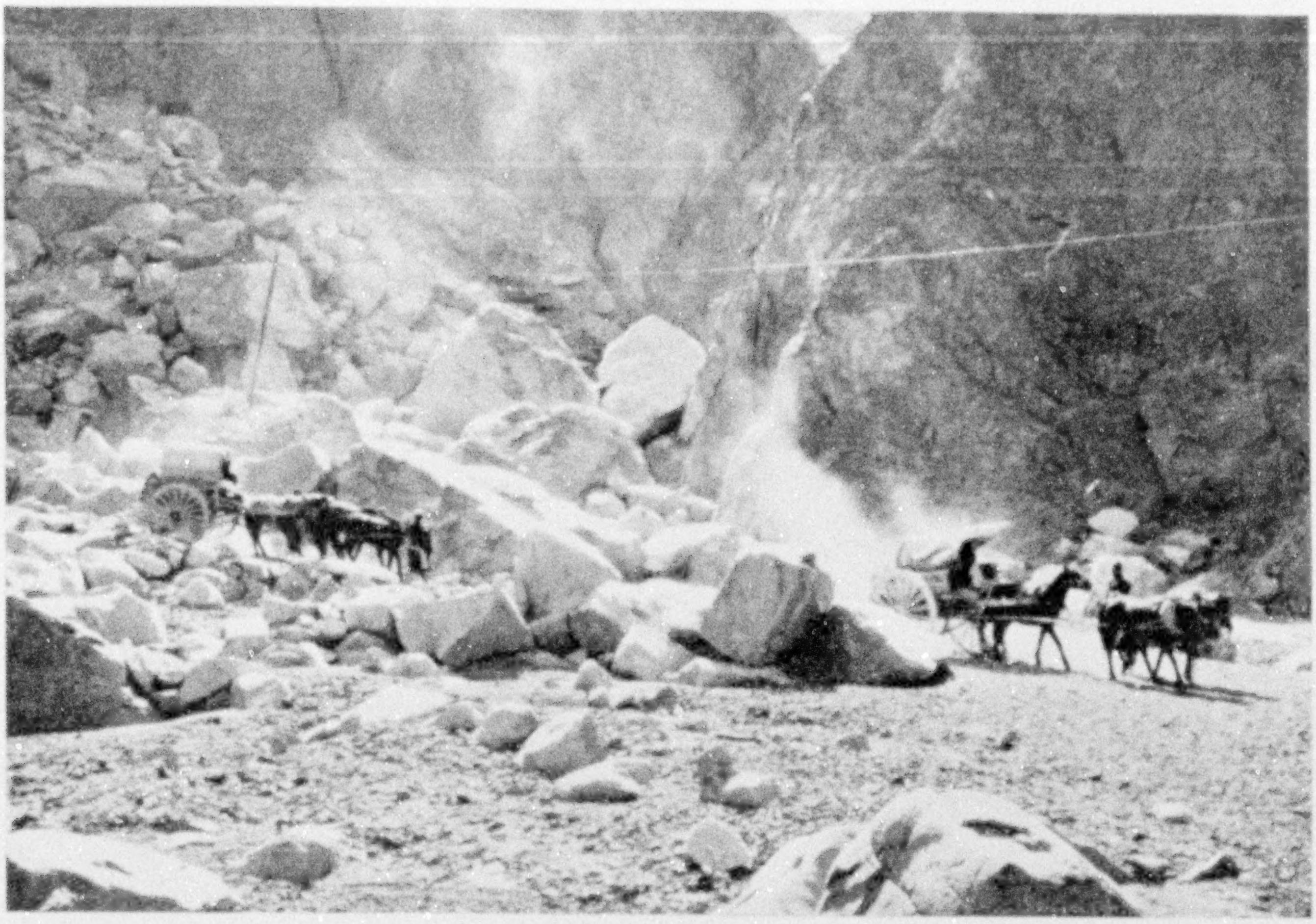


KAZAK YURTS DOT THE TEKES RIVER VALLEY LIKE BEEHIVES



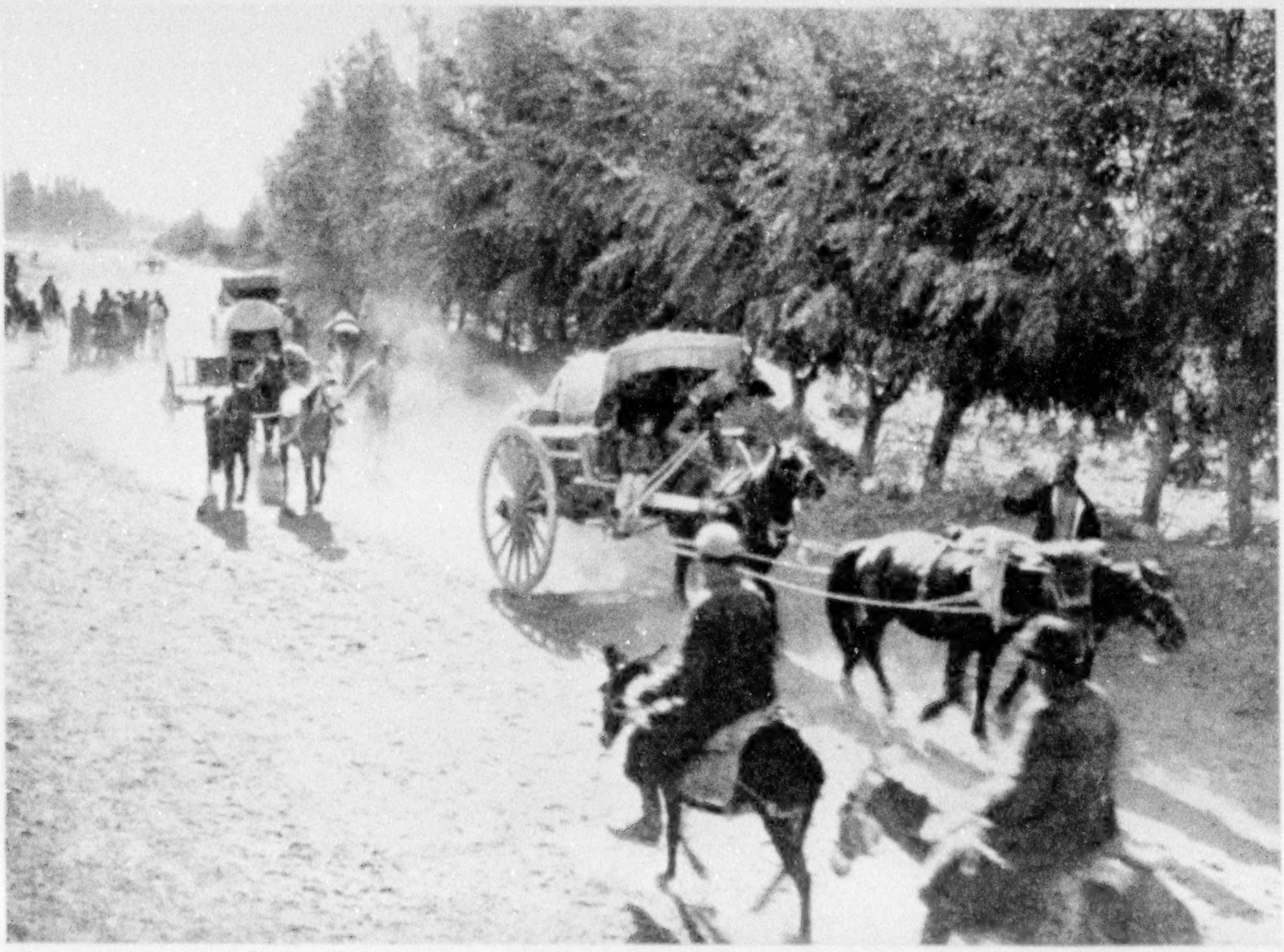
HOT BREAD À LA KAZAK

The oven is first heated with a small fire of fagots, then the dough is made into flat cakes, moistened with a paste of flour and water, and plastered on the inside walls of the oven.



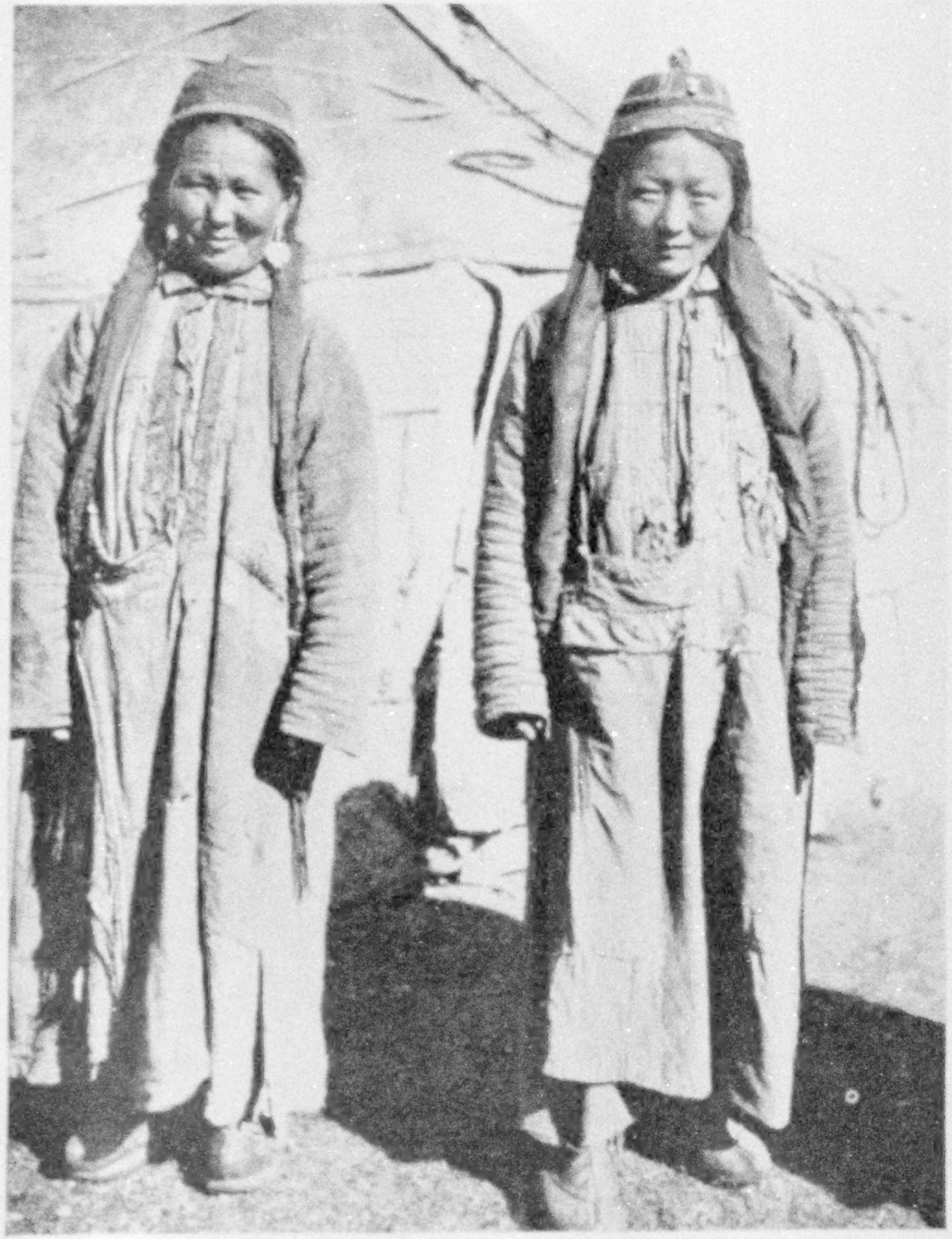
A HUGE LANDSLIDE ONCE BLOCKED THIS CANYON

The expedition is traveling over the main cart road from Karashar to the Turfan Depression.



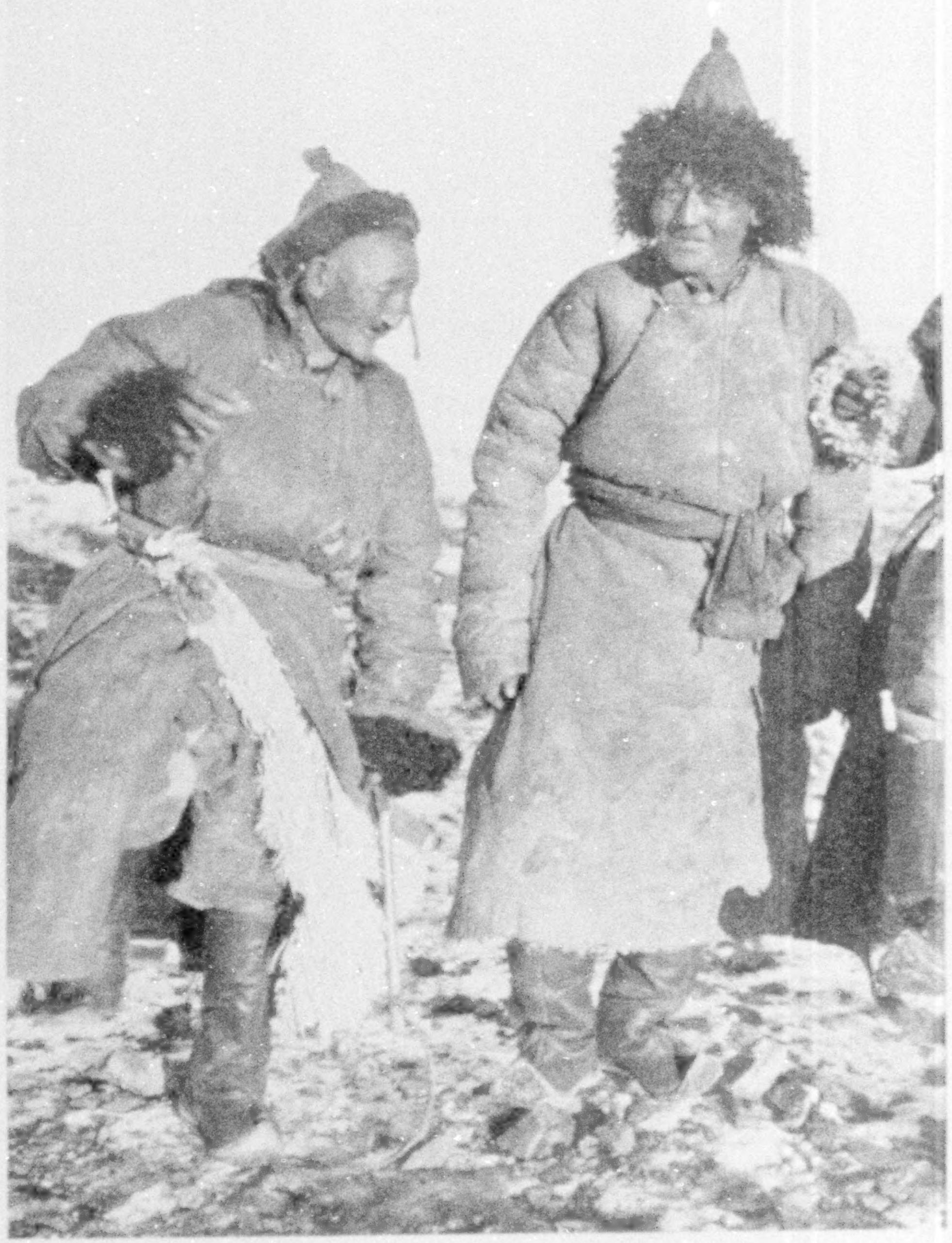
THE EXPEDITION'S "MAPAS" JOLT FORTH FROM KARASHAR

These oblong boxes on springless wheels are instruments of torture for the traveler, but make better time than the lumbering *arabas* (see illustration, page 404, and text, page 389).



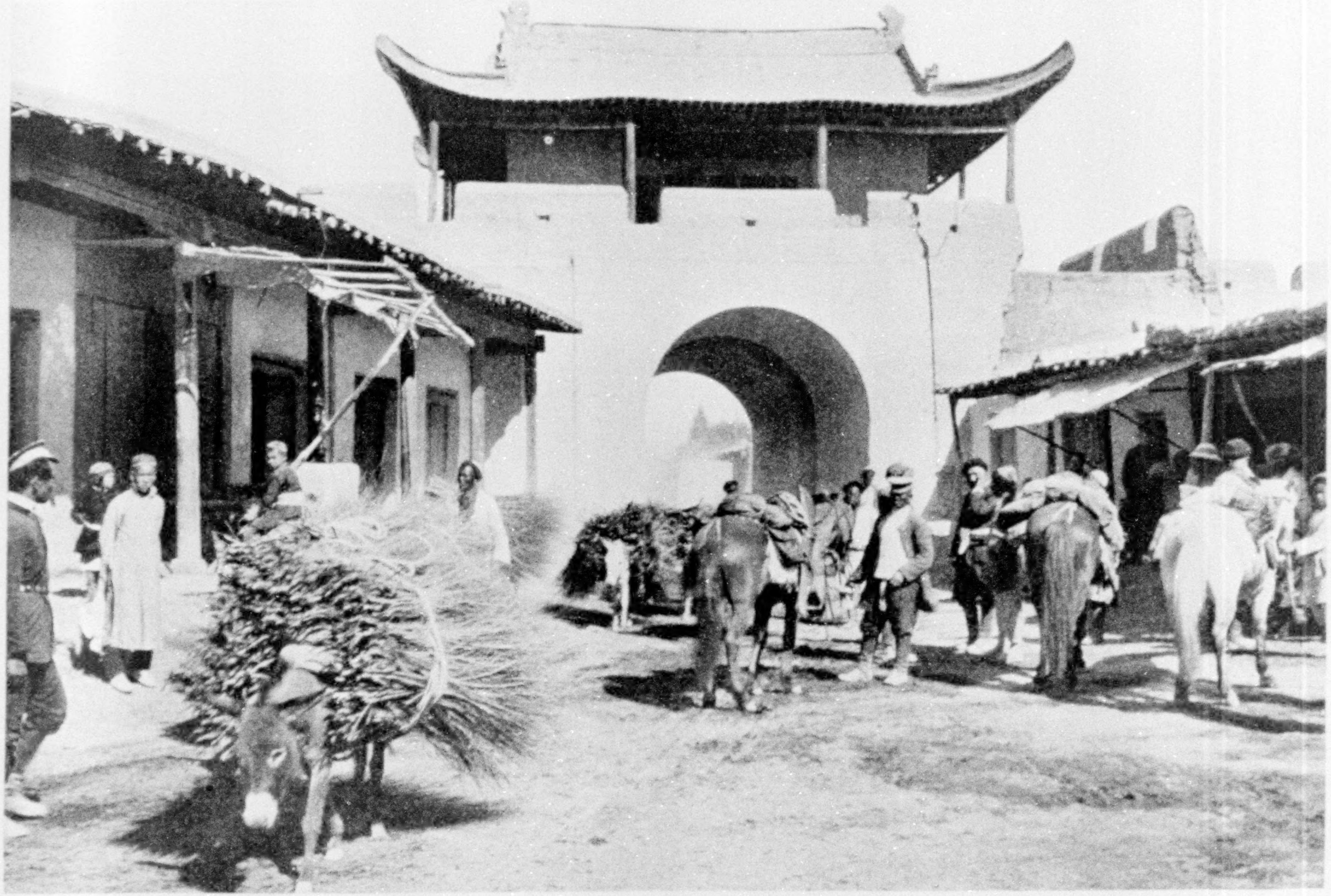
TENT DWELLERS OF THE YULDUZ VALLEY

The Kalmucks of this region are really Torguts, remnants of the once numerous Mongol tribe of that name. Though they have come under Chinese influence, they have preserved their own language and customs.



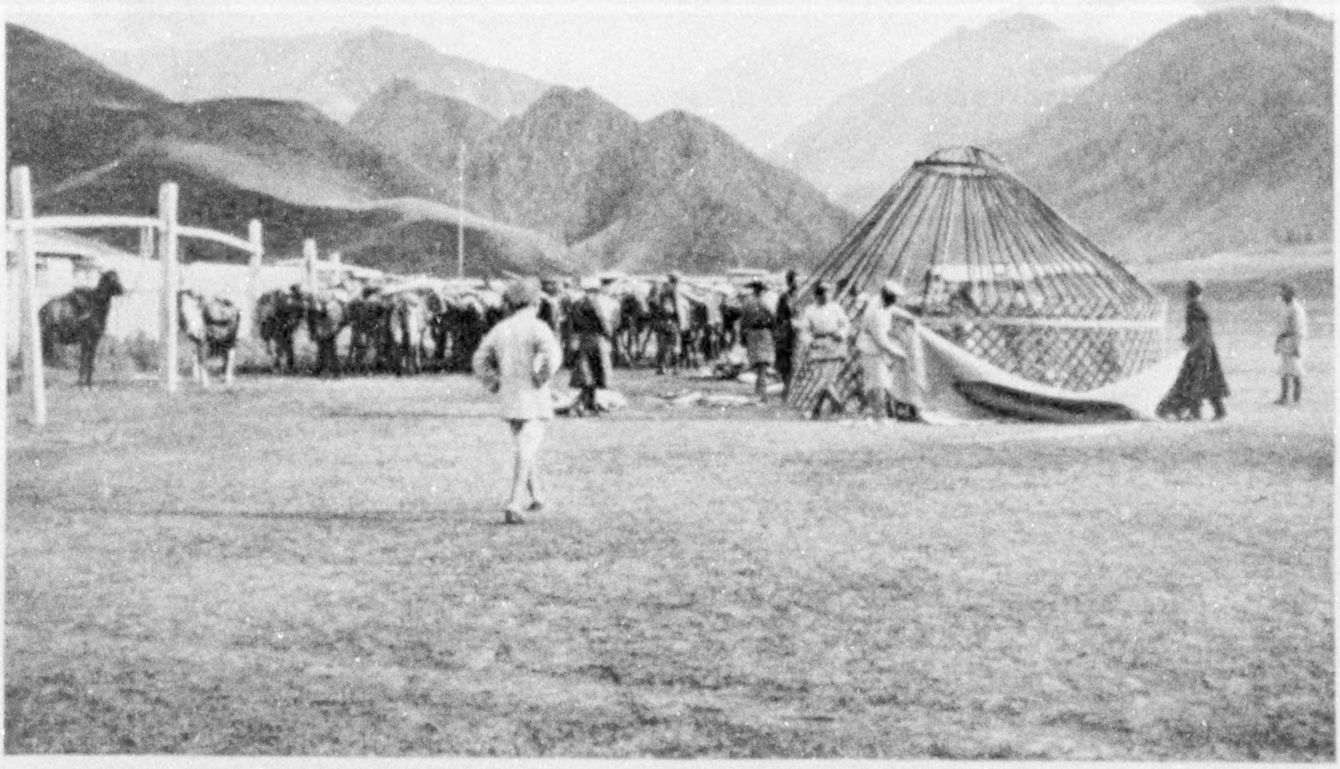
THESE GENTLEMEN ARE NOT VEGETARIANS

The "civilian" Mongols of the plains, away from the caravan routes, subsist almost entirely on a meat diet, usually of mutton. Their tea, the Chinese "brick" variety, is flavored with salt.



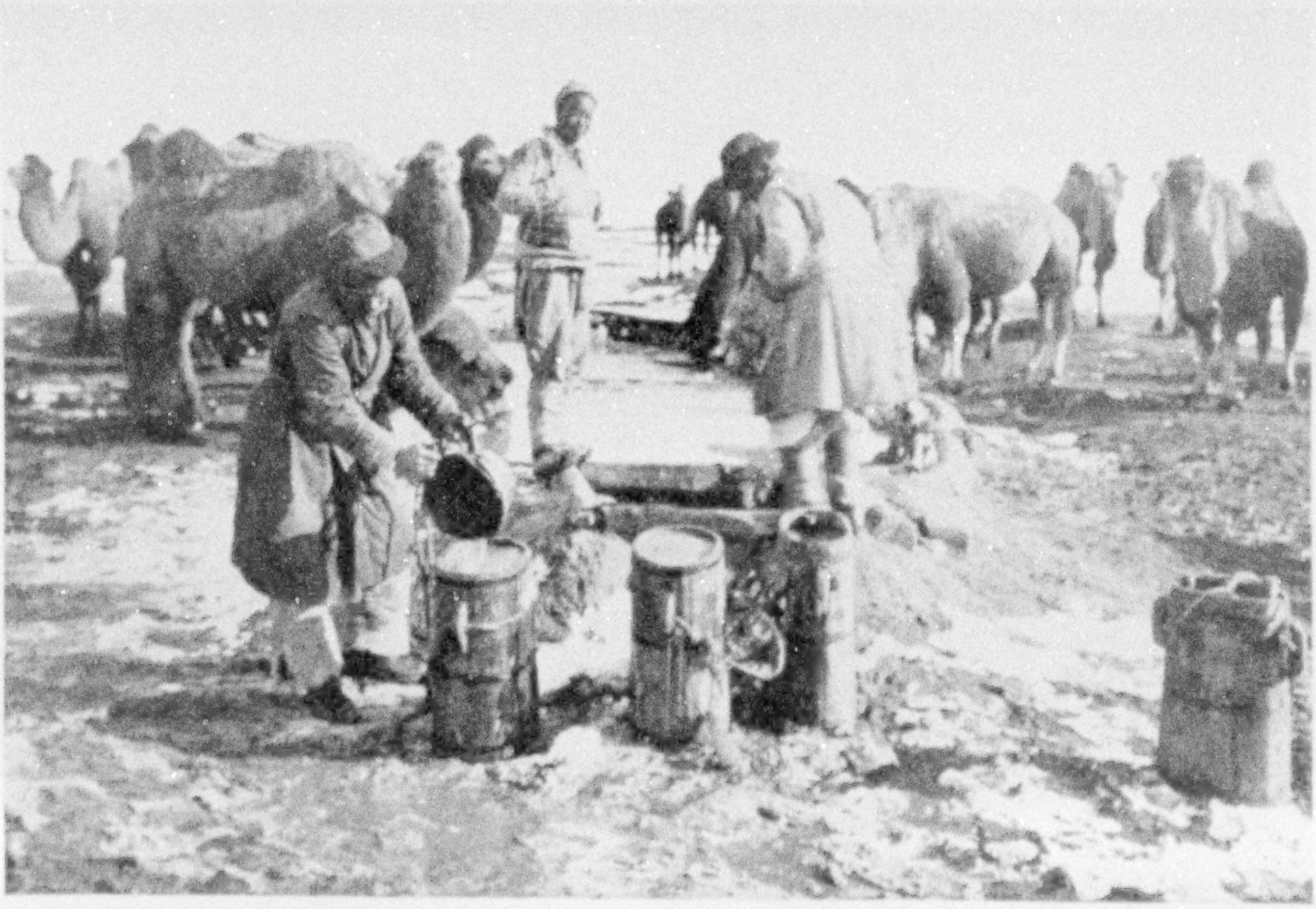
THICK WALLS AND FORTIFIED GATES ARE USEFUL IN KARASHAR

Disturbances in Chinese Turkestan and in Mongolia make a stout wall a comforting adjunct to every city. The two diminutive donkeys are carrying the sort of brush from which, throughout the Orient, coarse brooms are made for sweeping yards.



BUILDING A YURT FOR THE EXPEDITION'S USE

The scientists have stopped at a small Chinese military post on the edge of the Tekes Valley near Muzart Pass. The mountains are the southern range of the Tien Shan.



FILLING WATER CASKS AT A WELL IN THE DESERT

Though the desert of rock and sand is waterless, the water level is only six feet below the surface here. The water is dipped from the well into the broad tanks for passing caravans.

were wide alkali plains, where the hardened crust had an appearance of broken ice cakes. The deepest point is 980 feet below sea level; our elevation was approximately —910 feet where we turned north to reach the city of Turfan.

The depression is a wide valley, 70 miles in length by 30 in width. From the bottom one looks north to the Bogdo-ola peaks (see, also, map, page 374), more than 12,000 feet in height. The proximity of the depression to these mountain masses causes violent winds at times, and it was noticeable that sand drifted only on the southern sides of the rocks and small eminences.

Near the edges of the depression are many series of wells which follow underground streams of water, and which have been dug to depths of fully 50 feet with infinite pains, apparently to locate the subsurface flows.

Although there are tremendous alkali beds here, the water which flows in these underground streams is sweet and drinkable. Near the lowest point of the depression is a small lake of strongly alkali water which has no outlet, evaporation taking care of whatever moisture reaches it.

Beyond Turfan the cart road leads through rocky defiles three marches to Tihwafu, the capital of Chinese Tukestan, and more Chinese than other cities of Sinkiang. Like all cities in the interior of China and the Chinese portions of those in Turkestan, it is surrounded by a high wall. The city gates are closed at sunset and travelers arriving at night must remain outside until after sunrise, when the gates are opened (page 420).

A REMOTE RADIO STATION

We again found an excellently built and well-operated radio station and were able to send messages to the outside world, for it talks with Mukden, in Manchuria, and with Kashgar to the south.

There is also a telegraph wire connecting Peking with Tihwafu and Kashgar, though it is out of service much of the time. As we rode along this telegraph line, it was easy to see why the service is irregular. Less than half of the poles have insulators, and where an insulator is broken the wire is either nailed or tied to the pole.

We were guests of Mr. Cavaliere, the Chinese postal commissioner for Turkestan, and through his assistance we arranged for the governor's aid in procuring camels later at Kuchengtze. The commissioner also helped us replenish food supplies and engaged our transport east.

There is a colony of 200 Russians in the capital. At our request the Soviet consul gave us a letter of introduction to his colleague at Kobdo, in Mongolia. He said it would also be of service should we not go to Kobdo, but travel more directly eastward.

We could learn little regarding Mongolia, for since the revolution there has been almost no trade between Turkestan and that country; nor could the Chinese give us any assistance beyond the frontier, their authority in Mongolia having long since ceased.

THE "TELEGA" IS A CRUDE VEHICLE

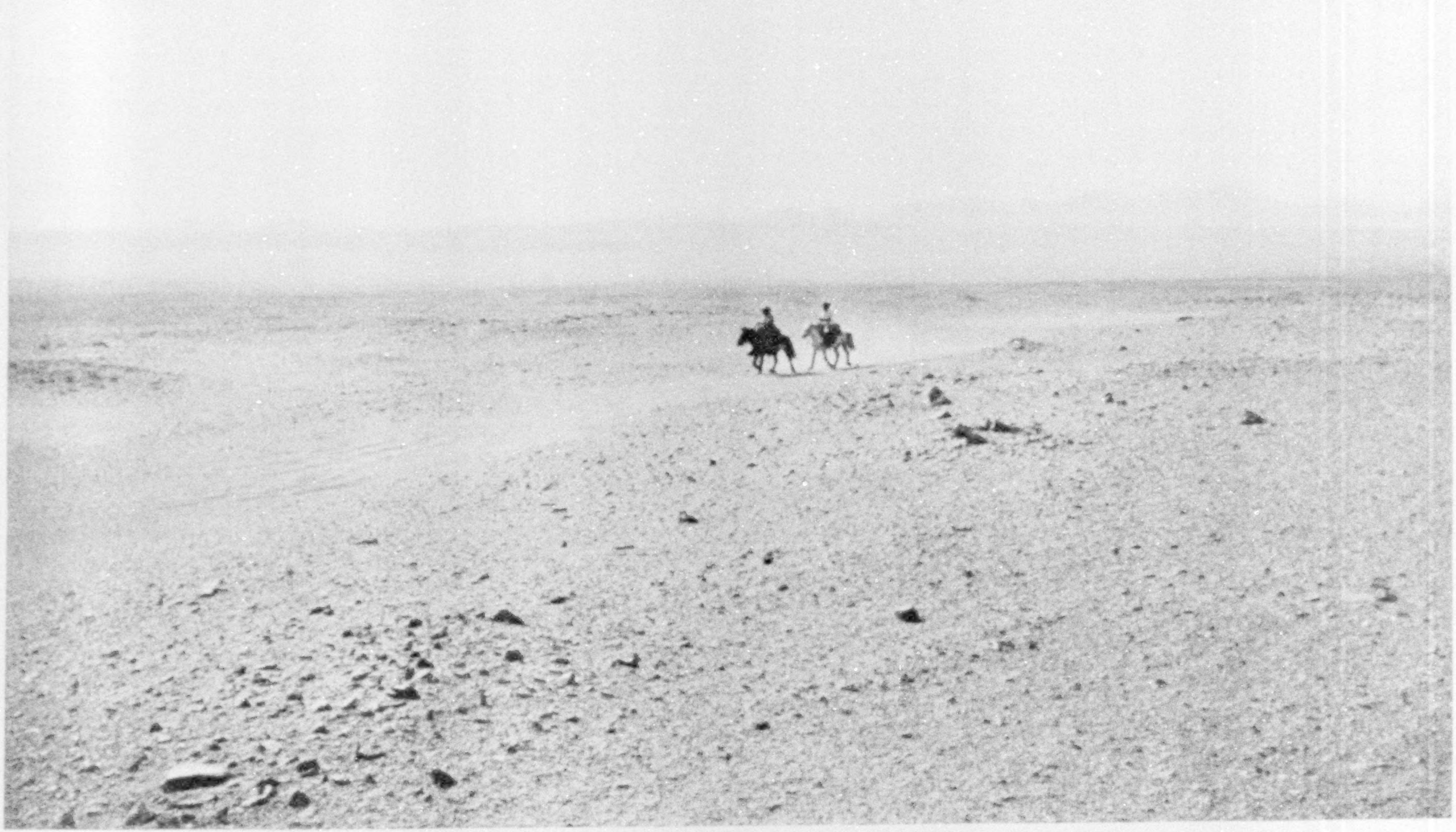
On the 11th of October we continued east toward Kuchengtze, using *telegas* for transportation of kit; we traveled beside these small, four-wheeled vehicles on horseback (see page 419).

In contrast with the 8-foot gauge of the lumbering arabas previously used (see text, page 390), the telega has a gauge of three feet. When we first examined these little vehicles, we felt doubtful that they would ever reach Kuchengtze. They were crudely constructed, rope and wire holding them together at vital parts, with wooden pegs used in place of bolts. Three small horses, hitched abreast, pulled each cart.

We were even more skeptical that these animals could travel the 150 miles in three days, as the drivers had promised. Not only did they do so, however, but they arrived in Kuchengtze at the end of the third day apparently traveling as easily as at the outset!

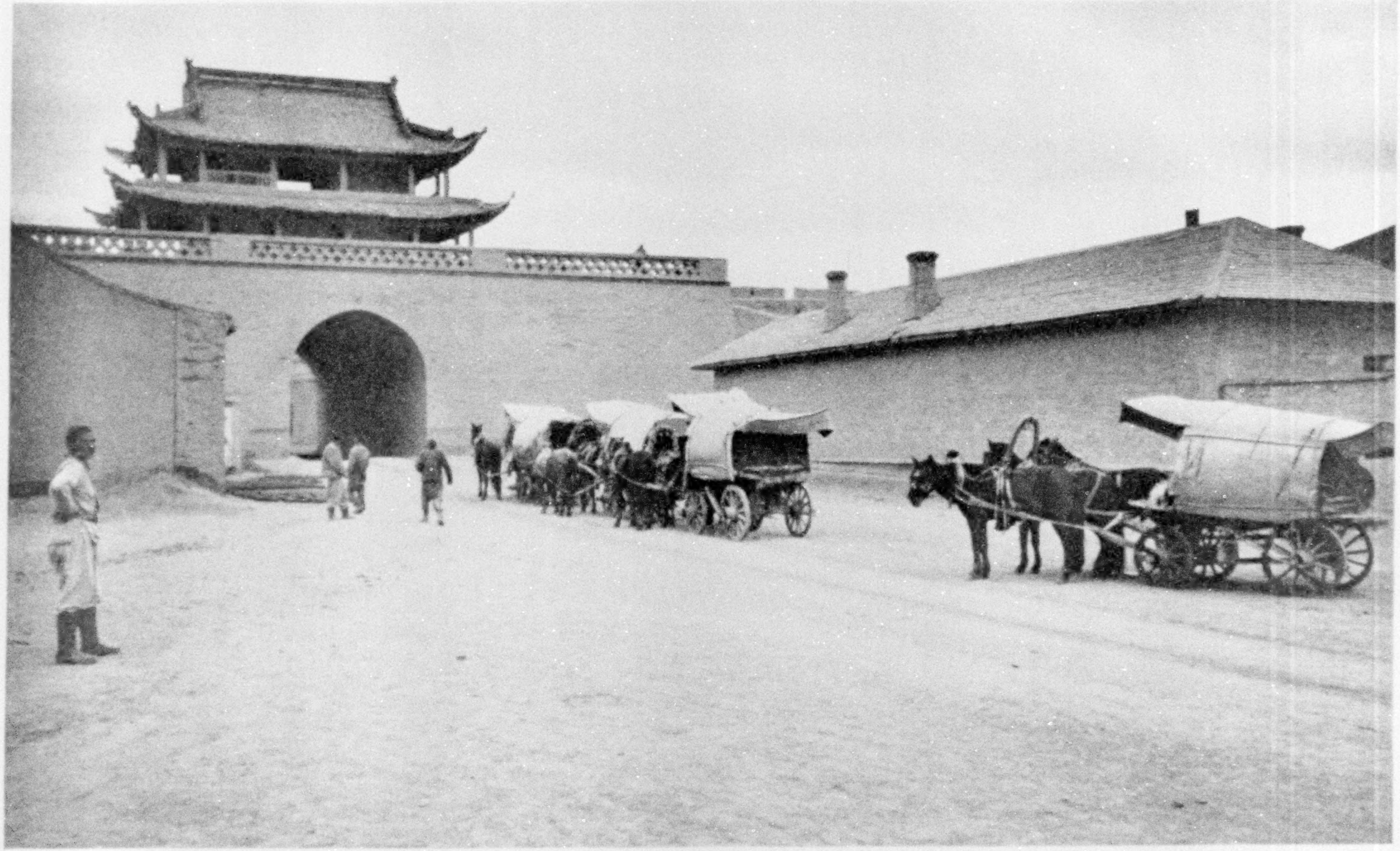
From here the road follows the northern slopes of the snowy Bogdo-ola, the local name for a portion of the northern range of the Tien Shan. Part of the way leads through irrigated areas and cultivation.

Hereabout we saw many evidences, in the abandoned farms and villages, of the results of an uprising in Turkestan some years ago. The natives drove out the



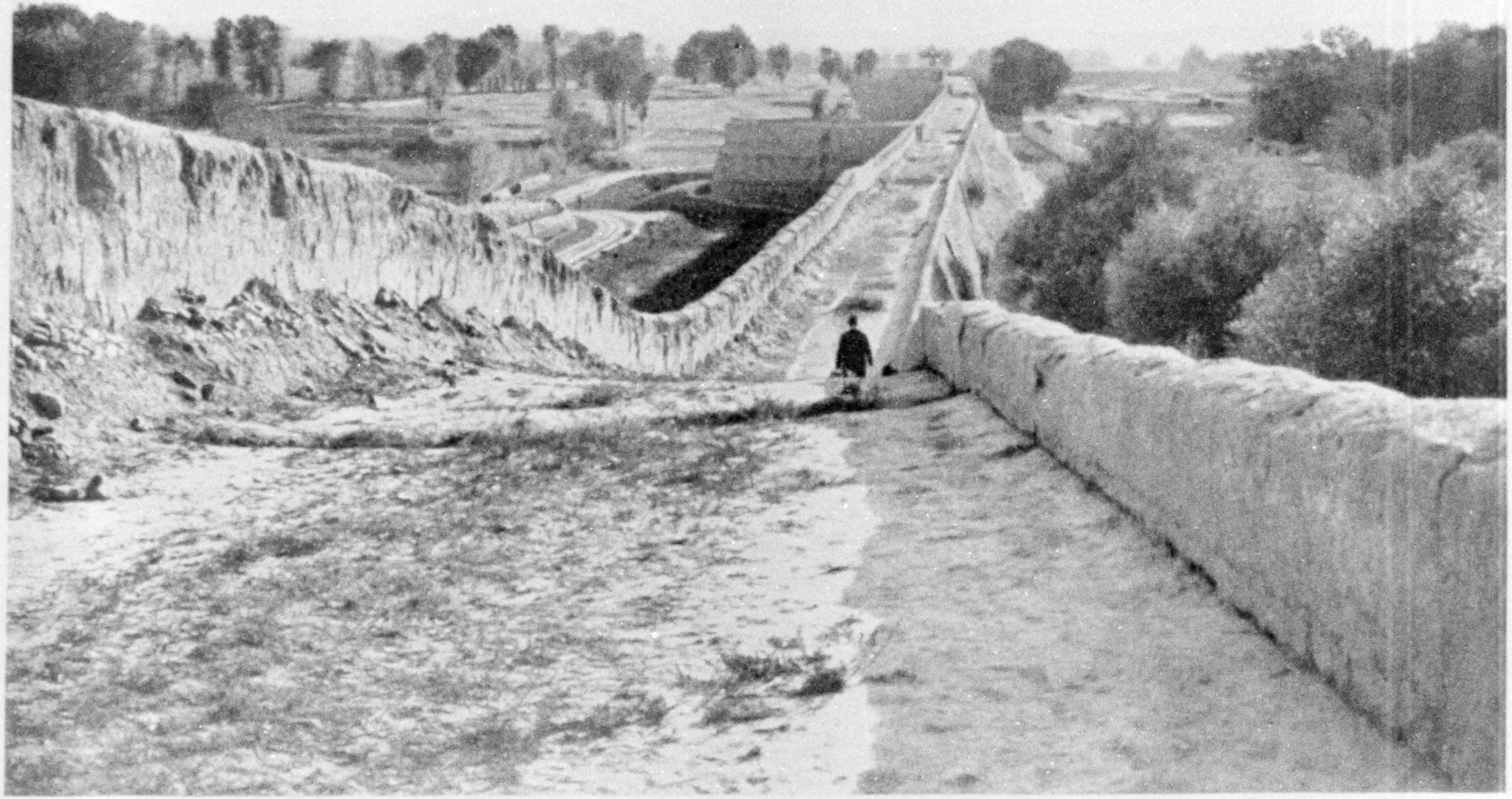
THIS GREAT BASIN LIES BELOW THE LEVEL OF THE SEA

The Turfan Depression, which is, with the exception of the shores of the Dead Sea, the deepest place on the earth's surface not covered by water, lies within view of the snowcapped peaks of the Bogdo-ola range. Terrific windstorms sometimes sweep down across the desert depression from these mountain heights. The few oases found along the edges are watered by subsurface streams (see, also, text, page 409).



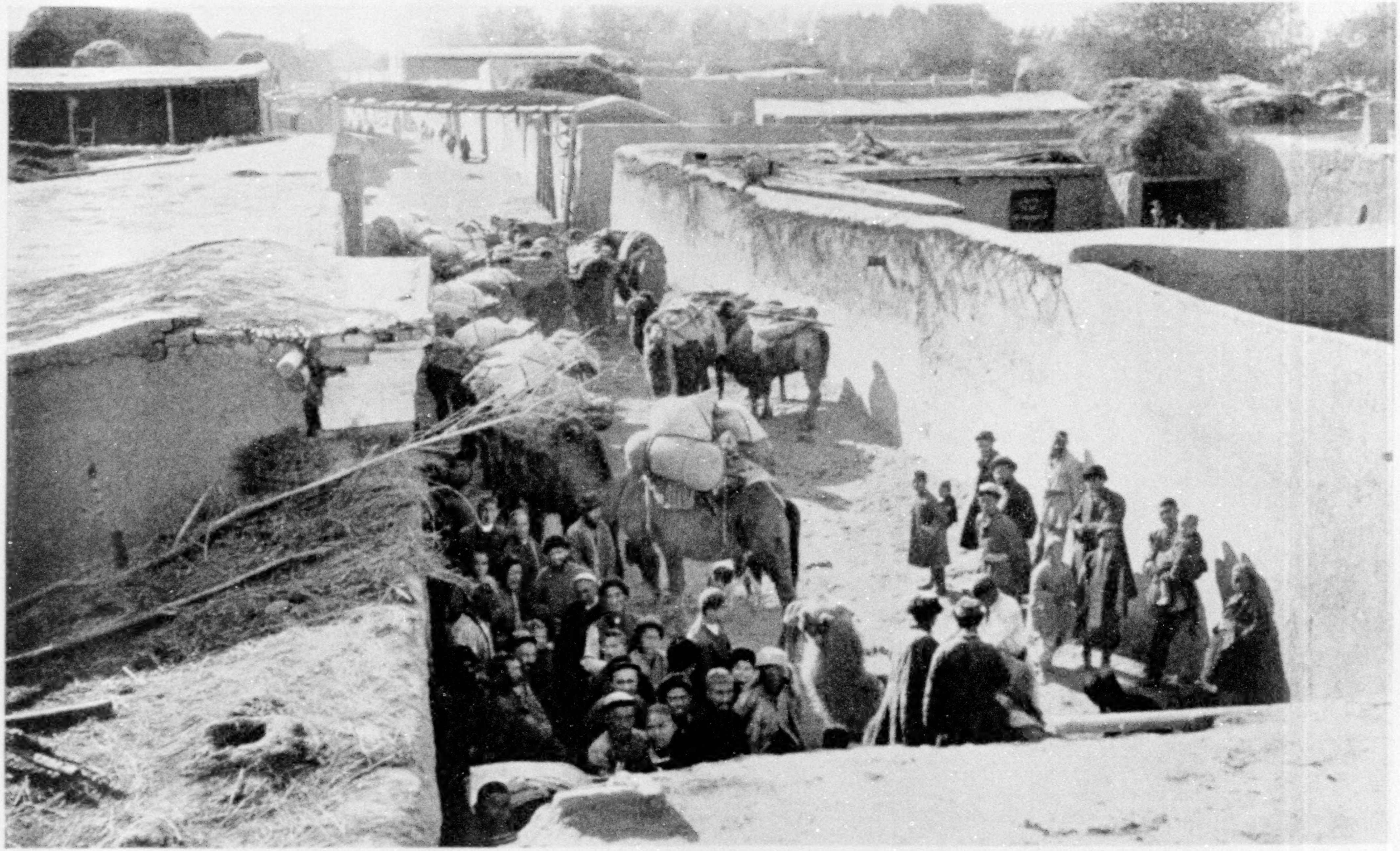
THE PONY CART "EXPRESS" LEAVING TIHWAFU

Telegas are used for fast travel along the north slopes of the Tieu Shan. Most roads are fairly level, so these small vehicles make good time. Three horses, hitched abreast, usually are employed, and they keep up a steady jog trot for hours at a stretch. Telegas are seldom seen south of the Tien Shan, where roads are more rocky (see, also, text, page 417).



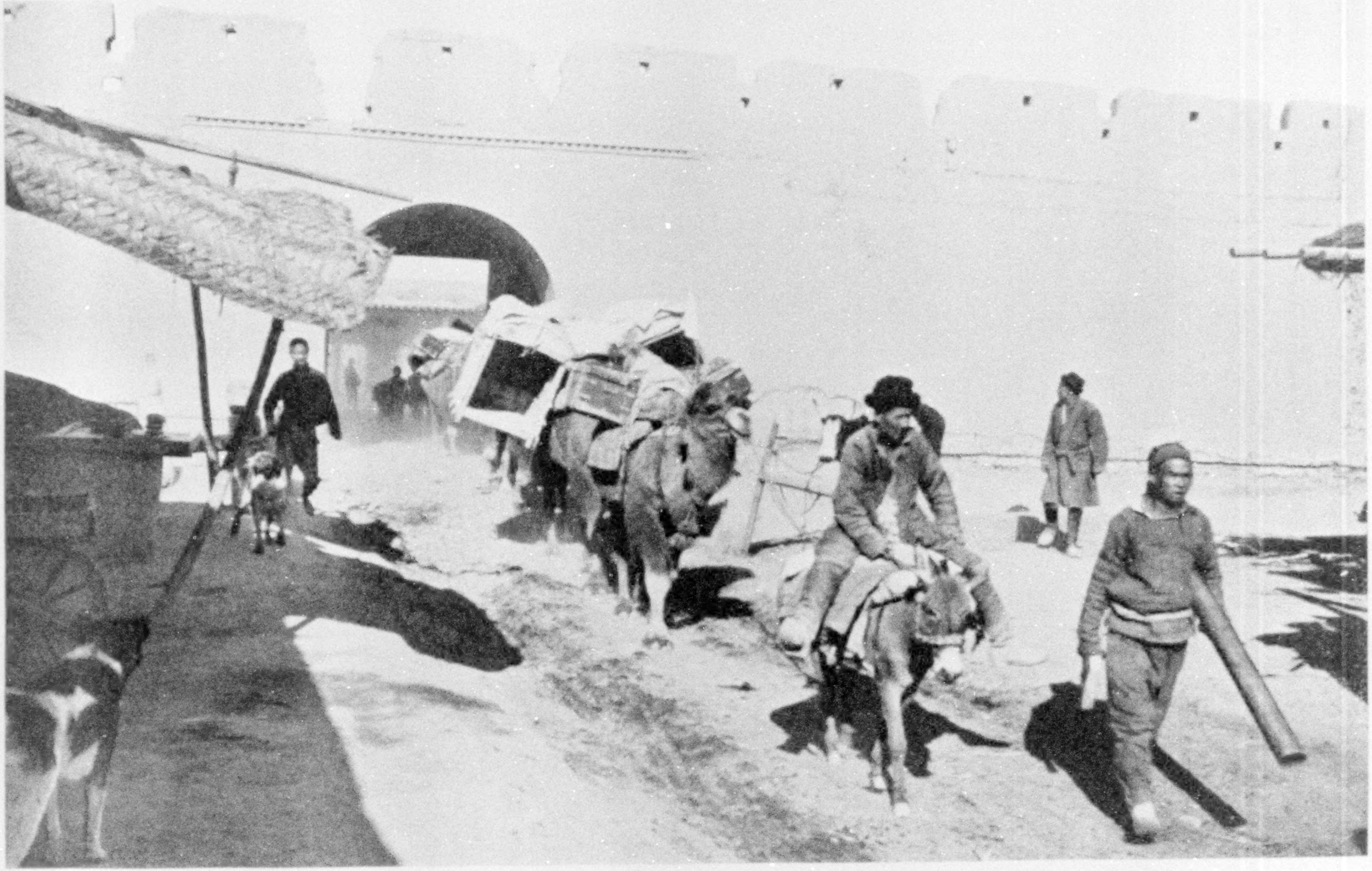
TIHWAFU IS WALLED IN WITH MUD

Travelers arriving at night at the gates in this long wall must remain outside until sunrise before they are permitted to enter the capital of Chinese Turkestan. Tihwafu (Urumchi) has radio communication with Mukden, in Manchuria, and with Kashgar, to the south (see, also, text, page 417).



KUCHENGTZE IS THE END OF THE CAMEL TRAIL FROM CHINA ACROSS THE GOBI DESERT

Though there are several Chinese caravan agencies here, the expedition had difficulty in obtaining camels for its proposed trip to Urga, in Outer Mongolia. Finally it rounded up 30 of the Bactrian, or two-humped, animals. This breed prefers cold weather and travels best at night, when it averages about two and a half miles an hour, a half mile more than in daytime.



STARTING FROM KUCHENGTZE TO CROSS THE MONGOLIAN DESERT

In this country, where the "iron horse" has not penetrated, and where the roads and trails often preclude the use of motors, camels, donkeys, and ponies transport men and goods across the barren stretches of the desert.

Chinese and set up an independent government. Later, the Chinese returned with an army which took several years to make the journey from China, as it lived on the country and halted for months at a time to grow necessary crops. Since then there has been a small influx of settlers, but the district has not yet regained its former prosperity.

Much of the farming below the northern slopes of the Tien Shan is done by Tungans, Chinese Mohammedans from central China. Considerable numbers are found in Tihwafu, Karashar, and Kuchengtze, where they sometimes hold government posts.

Kuchengtze is the outfitting point for caravans crossing the Gobi Desert via the Kansu route to China, so we did not anticipate great trouble in forming one for our journey into Mongolia. There are two Chinese forwarding agencies here, branches of houses in Tientsin, but when they learned that we wished to go into Mongolia they had no camels available.

Only after an anxious week were we able to engage 30 camels from a native, who charged the full sale value of the animals as hire, though he furnished equipment and five men without further charge. We had been told that better time might be made if grain were carried to feed the camels, so that long stops for grazing would be unnecessary. Our caravan *bashi*, or leader, did carry a certain amount of grain, but we later found that some grazing is necessary to keep camels in proper condition. A *Chanto*, as Turkis of northern Turkestan are called, was engaged as guide and Mongolian interpreter.

For ourselves and our man we bought heavy sheepskin coats and large felt boots, as cold weather would doubtless overtake us.

THE CARAVAN "JOH" MAKES THE FOREIGNER SEASICK

Inasmuch as the Asiatic camel prefers cold weather and travels best at night, we had two *johs* constructed. These are wooden frameworks, felt covered, and are slung on each side of the animal. Chinese officials use johs for caravan traveling and at night sleep curled up inside. We found them only moderately successful, as one's position was terribly cramped, and when the weather was cold it was difficult to keep warm. At first, Clark and I were thoroughly seasick from the unusual motion.

We left Kuchengtze October 23, on a perfect, sunshiny day, and looked forward to good weather for at least another month. That night, however, a *buran*, the violent wind of Turkestan, struck us, and for over two hours we struggled to keep our tent and kit from being scattered about the country. Next morning the ground was covered with snow, and from then on, for the remainder of the journey, we had constant snow and cold weather.

HEAD TOWARD MONGOLIA ALONG ROUTE WHERE ANTELOPE RANGE

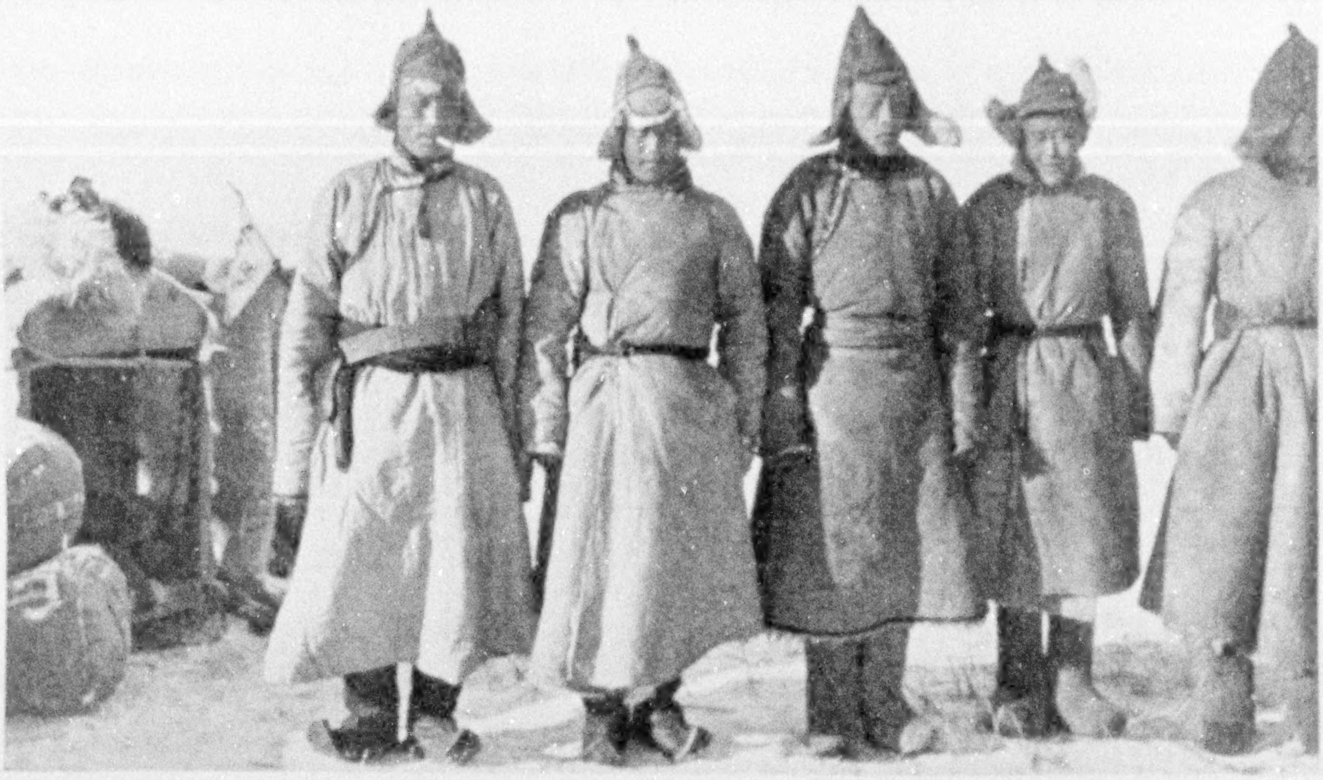
The guide decided that our best route from Kuchengtze would be diagonally northeast into Mongolia, bringing us to the main caravan road south of Ulyasutai. Saiga antelope (see text, page 389) were believed to range not far from the trail at one point and we were hopeful of finding them.

Owing to the scarcity of water, there is little summer travel along this route, though, as the ground was covered with snow, we were able to camp wherever a sparse growth of bush furnished fuel, melted snow being our water supply. One camel carried two water casks, but these were unused much of the time.

The country was barren, having no growth except dry bunches of grass, with here and there small areas of low, thorny bushes. Ranges of hills showed dimly in the distance, and after several days' marching we came to a more broken country, where rocky ridges ran from northwest to southeast. These were the foothills of the Mongolian Altai, the great range which spreads diagonally across western Mongolia from the high mountainous country of southern Siberia.

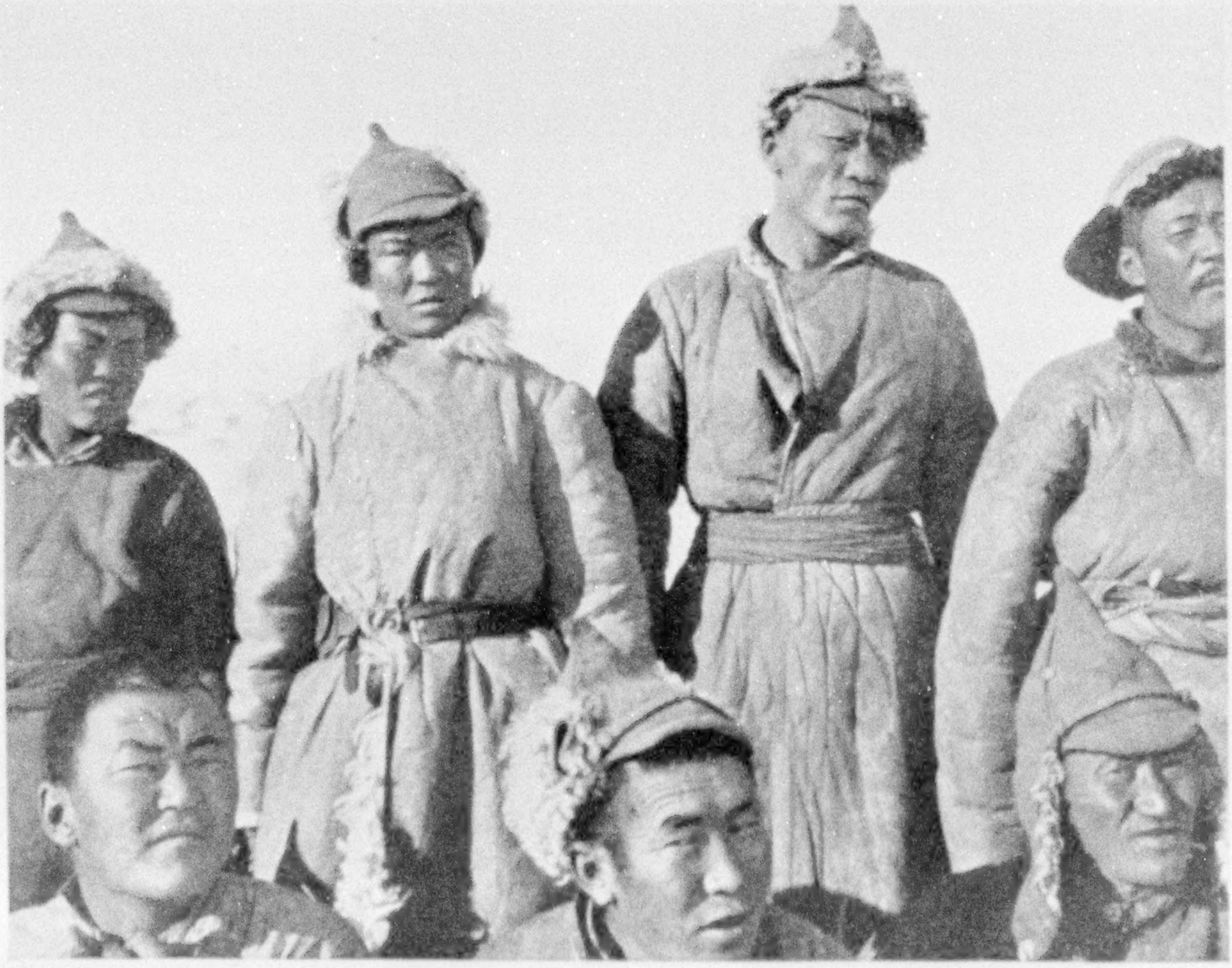
We met few people, as this part of our route crossed a desert where even wandering Mongols do not come.

After two weeks of steady traveling, our guide said that we were in the neighborhood of the first Mongol outpost. He suggested a detour around it, as the Mongols might rob our caravan of its grain. We rejected this advice, however, as we wished to present credentials at the post



THEY WERE WOLVES IN SHEEP'S CLOTHING TO THE EXPLORERS

These Mongol soldiers, who captured the expedition members, wore coats of sheepskin, with wool inside, for warmth. That of the Buriat officer on the left is an especially swagger garment overlaid with brilliant blue silk, lined with sheepskin, and tied with a yellow girdle.



THESE MONGOLS KNOW ONE SCIENCE—THAT OF TORTURE

The tallest of the group was the author's guard during the night of the party's imprisonment. Each time the expedition leader tried to warm his cold-benumbed hands over the fire, this man knocked him back (see text, page 429).

THE MOUNTED POLICE OF MONGOLIA

These two young soldiers, the expedition guard on the journey across the Altai Mountains to Kobdo, were more amiable than most of the Mongols. Their American prisoners gave each of them a sheath knife on their arrival at Kobdo, and the guardsmen reciprocated by presenting the explorers with a Chinese dollar, the only present they could muster.

and obtain a new guide, a local man who knew the country in more detail.

We did not, of course, anticipate any trouble with the Mongols, as there had been none with the Russians in the Pamir, nor with the Chinese in Turkestan. Our Russian credentials, we thought, would be of service, particularly as we knew Soviet influence was strong in Mongolia.

THE POCKET FLASH LIGHT ASTOUNDS THE MONGOLS

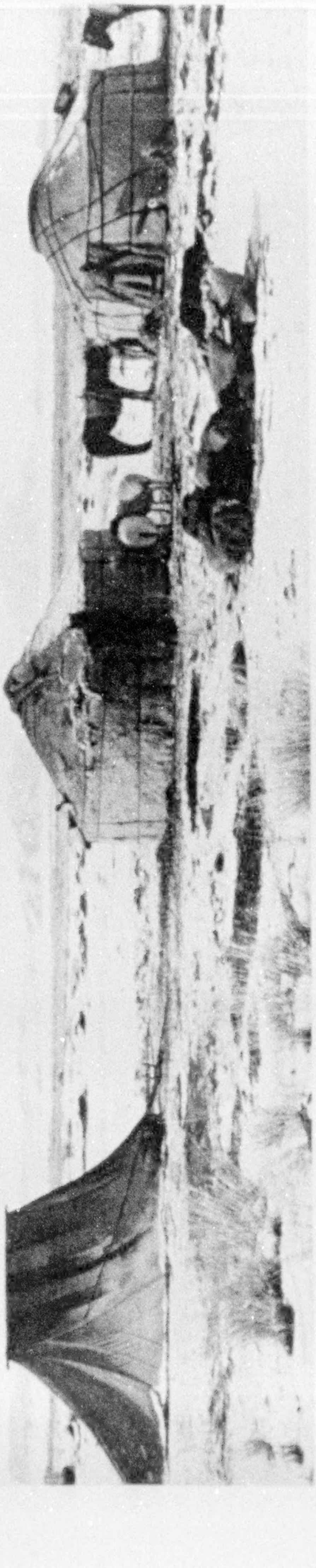
On the evening of November 6 we noticed dark objects to the right. We first thought they were wolves, but as they advanced in the growing darkness we saw they were horsemen. They halted the caravan and rode up and down the line of camels, fingering loads and looking carefully at everything. At their shouts, others came from different directions, and we suddenly realized that we were surrounded. The horsemen wore peaked helmets similar to those of Russian soldiers in the Pamir, so we knew we had found the outpost.

It seemed best to make ourselves known; so, turning our pocket flash lights on our faces, we told the interpreter to tell the soldiers that we were white men wishing to go to the post. These Mongols had never seen electric flash lights, and the sudden light, without fire, amazed them. They encircled Clark and me and hustled us downhill where dark objects in the gloom indicated the post.

We were hurried into a yurt, where eight or ten men squatted about a fire. They looked up with scowls, and we could see at once that they were suspicious and unfriendly.

Through the interpreter, we asked for the commanding officer, but received no response. Then one of the soldiers inquired if we had Mongol passports. We were forced to admit that we had none, although we at once produced our American passports, Russian letters and permits for their inspection. These they examined upside down and backward, finally contemptuously throwing them aside.

They looked at us fixedly, whispered together, looked at us again, and finally one



JIJIHO, THE MONGOL POST, WHERE THE EXPLORERS WERE TORTURED AND HELD PRISONERS

by one left the yurt. As we could hear our camels coming in and could get no information from the Mongols, we decided that the interview was ended for the evening, and that the best thing to do would be to make camp and await the pleasure of the officer the next day.

MONGOLS ATTACK THE EXPEDITION

We arose and started to leave the yurt, our man Mohammed, being nearest the door, going first. As he stepped forward, a Mongol struck him in the face and knocked him down. Before we could get the meaning of this, the Mongol raised a shout which brought soldiers rushing into the yurt, two carrying ropes.

Clark and I were set upon by several men. Our struggles, though ineffectual, seemed to infuriate them, and both of us went to the ground. As I lay, I saw one Mongol take a kettle of boiling water from the fire to pour on my face. I shut my eyes, turned my head sideways, and fortunately the water did not strike me.

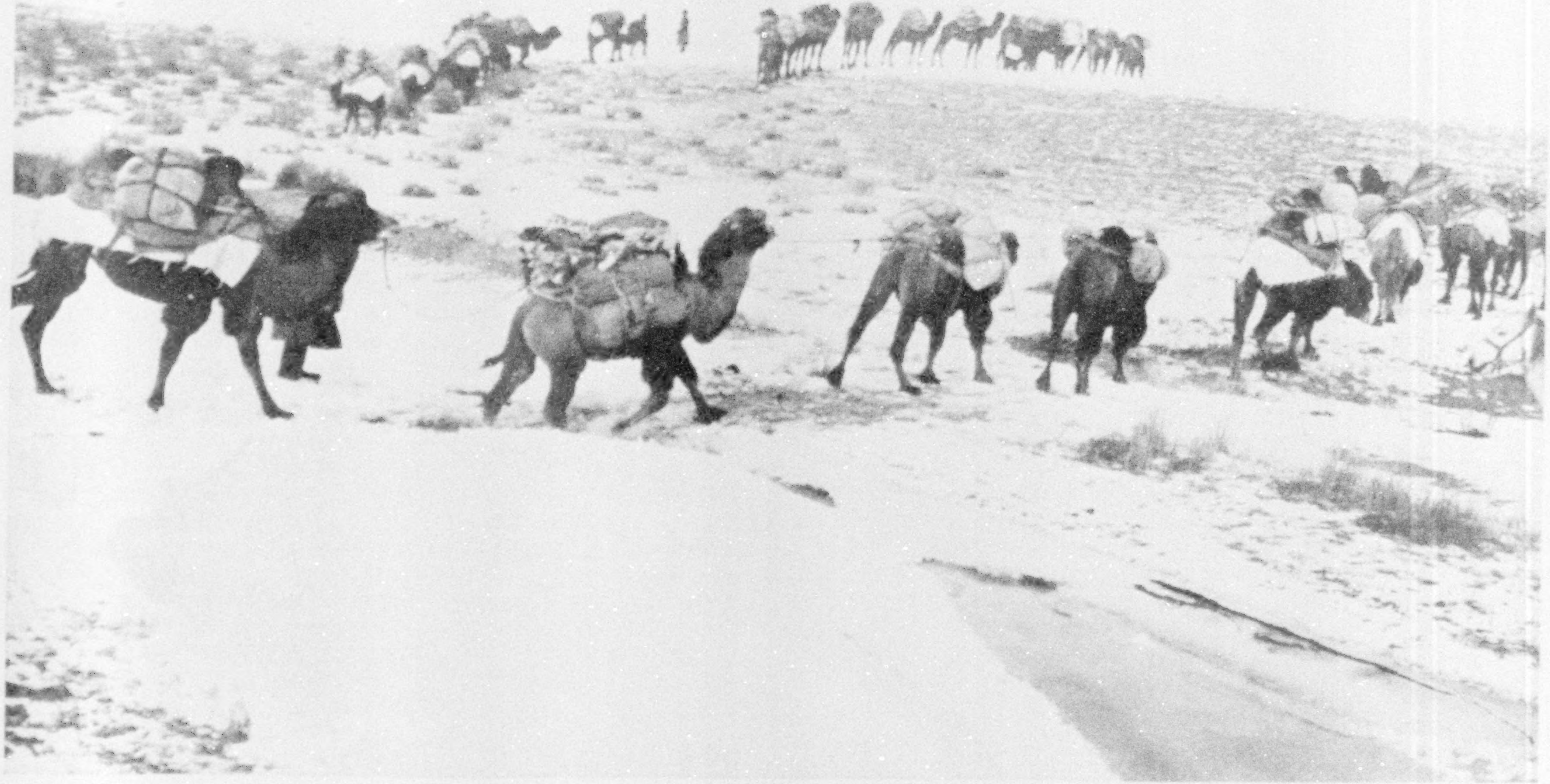
They tied our wrists as tightly as two men, seated on the ground with feet braced against our crossed wrists, could jerk the ropes. Then they poured hot water on the ropes, so that in drying they would shrink and tighten even more. Our men were also set upon and bound in like manner, being badly beaten in the process.

After we were helpless they rolled us on our backs and carefully went through our clothing, taking everything from our pockets. We asked the interpreter what they intended doing and were told that he had heard a Mongol say that we were to be shot, although he was uncertain whether it would be immediately or the next day.

RESIGNED TO DEATH

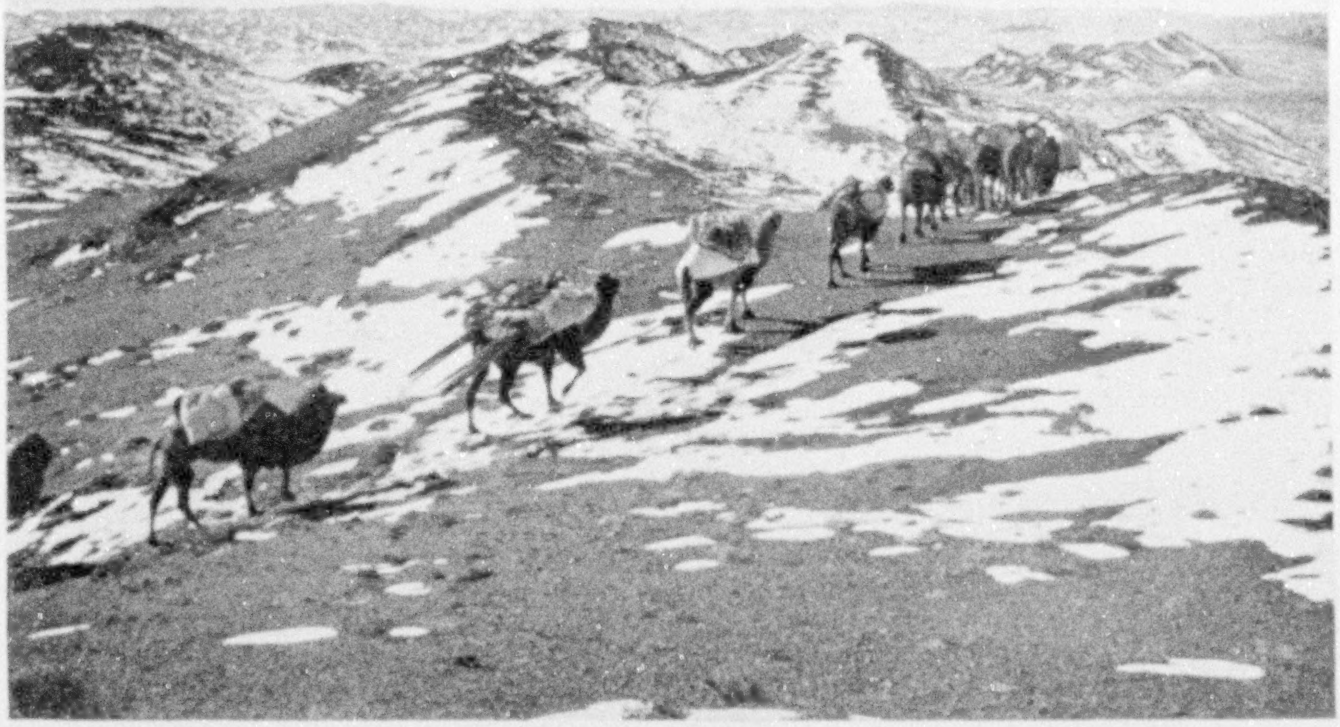
Strangely enough, instead of being frightened by the prospect, as the ropes grew tighter our sincere hope was that they would make it short and quick, without dragging out a process which promised to be exceedingly unpleasant. There was but one thing to do: take what might come as quietly as possible, without giving our captors the satisfaction of seeing us weaken.

We talked of various things, among others whether the outside world would ever learn exactly what had happened to



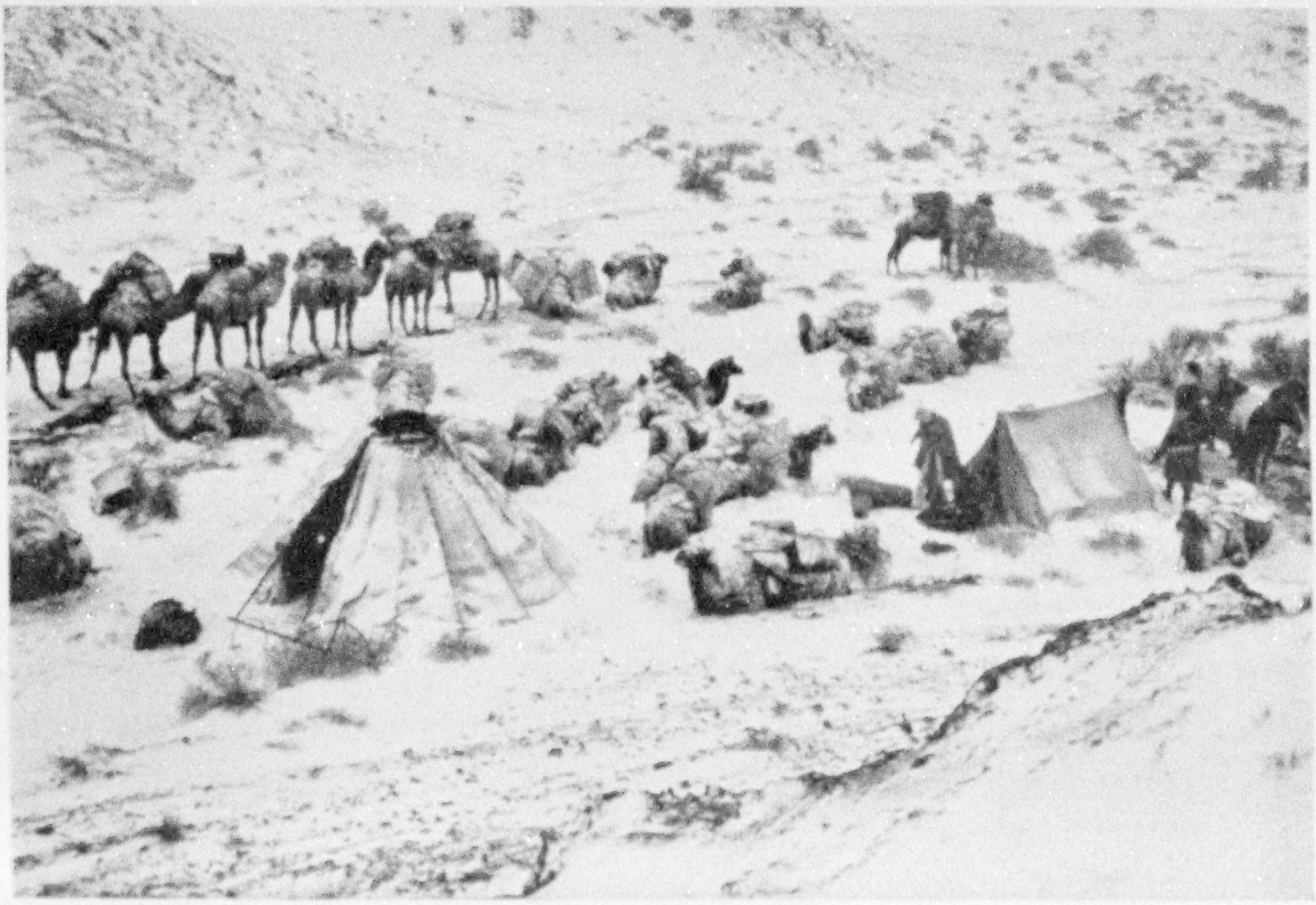
A DESERT "FLEET" GETS UNDER WAY

Bactrian, or two-humped, camels are highly esteemed by the Mongolians as beasts of burden. They are almost impervious to cold, owing to their thick coats, and are noticeably more efficient when the temperature is low. They are very awkward in deep snow or on ice and they greatly dislike to ford streams (see, also, illustration, page 428).



THE CARAVAN PLODS OVER A DESERT WITHOUT A TRAIL

Near the Mongolian border the camels frequently had to strike across the desert without a trail, which, where it existed, was a little-used short cut to the main caravan route.



ENCAMPED IN THE FOOTHILLS OF THE ALTAI MOUNTAINS

When the explorers arrived at a camp site the camels were unloaded and picketed, kneeling, on a spot cleared of snow. Thus they remained all night. Sometimes by morning they resembled snowdrifts. However, their long woolly coats protected them.

us. As nearly as we could decide, the actual facts would never be determined. The Mongols would probably not admit having seen us, or, if they did so, would claim that we had attacked them, and that they had been forced to kill us in self-defense.

As our hands became cold we tried to warm them over the little dung fire, but at each attempt we were struck in the face and knocked back to the ground.

THE MONGOLS APPLY TORTURE

How long we remained in the yurt it was impossible to know; probably between one and two hours. Then we were ordered outside. As we left the yurt we could see a squad of soldiers with rifles silhouetted against the stars. Clark and I said good-bye to each other, because, so far as we could see, it was a firing squad which awaited us. We were led a short distance to the right, apparently being marched to a selected spot to be shot.

We were directed, however, into a small caravan tent which we had not seen before. There we were again thrown to the ground. Seated back to back against a tent pole, ropes were passed about our bodies and arms and we were securely tied to the pole, our wrists still bound in front of us. Then the crowd left us, after placing an armed soldier on guard.

We thought we were there for the night. This brought up an even more unpleasant prospect, for were we kept several hours in that position, with the circulation in our hands absolutely stopped, by morning they might be frozen. As we were hundreds of miles from any medical attention, this might mean the loss of our hands or death, even though we were later released.

The pain became excruciating. As we had been without food since early morning, we were weak and hoped we might faint. It was probably well that we did not, for there would have been greater likelihood of our hands freezing, as the temperature was well below zero.

Mongols were continually entering and leaving the tent. One of them, we believe, really saved our lives. He was an older man, not a soldier, who could speak a certain amount of Chinese, as could our servant Mohammed. They were thus able to dispense with the interpreter, who had proven himself of little use, particularly when thoroughly frightened.

I caught enough of the conversation to realize that Mohammed was telling the Mongol about us, particularly emphasizing the fact that we were friends of the Russians. In the yurt we had told the Mongols that we were Americans, but that had meant nothing to them; apparently they had never heard of America. They did, however, know Russians, and we afterward thought that our being represented as their friends probably prevented them from shooting us as spies.

How long we remained in the tent with our wrists tied we never knew; probably from one to two hours. Now and then a soldier came in and felt our hands. Though this meant nothing to us at the time, the Mongols probably knew how long they could apply torture by this method before doing permanent injury. That it was intended solely as torture we now know, for Dr. Andrews has since told me that he has seen it being done in the Mongol jails at Urga.

BOUND TO A POLE FOR TWO NIGHTS

After another long wait, they again felt our hands and, apparently finding that the limit of endurance had been reached, unbound them. That gave us our first slight hope that, even though we might be eventually shot, we were not to be tortured to death. They gave us heavier coats, some salty tea, which is the usual beverage of the Mongol, and later some hard bread. They even brought a few of our own cigarettes, which had been taken from our pockets, put them into our mouths, and lighted them for us.

Then they tightened the ropes which bound us to the pole, posted an armed guard in the tent, and left us for the night. Toward morning, probably through sheer exhaustion, we got a little sleep.

Sometime after daybreak they violently awakened us and ordered our man Mohammed outside. He had hardly left the tent when two shots barked out. It seemed that surely the end had come, and one of us remarked, "There goes poor Mohammed; I wonder who's next."

We had guessed wrongly, however. Two hours later he was led back and we learned that they had taken him out to

ICED MUSTACHES ARE IN VOGUE IN SIBERIA

These men, who drove the expedition's sleighs on the journey through Siberia, were divergent types. The man on the left was brown; the center figure, with his ruddy complexion and blond hair, suggested an Englishman, while the man on the right was oriental. They faced the cold stoically, though all had frosted faces before the journey's end.

open various boxes, so that they could see the contents. The shots had been fired by a soldier who was experimenting with my automatic pistol. Our arms and ammunition, of course, had been taken from us immediately on arrival at the post.

Late that afternoon a young officer arrived and had us brought before him. He looked over our papers and questioned us. We hoped that he might tell us something, but we were taken back to the tent still wondering, and once more tied to the pole to spend another uncomfortable night.

THE MONGOLS MARCH THEIR PRISONERS OVER THE ALTAIS

On the second morning, after 36 hours of incarceration, we were released and ordered to make camp by the post. Then the officer went through our kit thoroughly, confiscating field glasses, compasses and instruments.

The following day he sent us under guard to another post 30 miles away, where we were again tried by two officers. We asked to be sent under guard to Ulyasutai, as this was on our route, but permission was quickly refused. Then we requested to be allowed to return to Turkestan. This was also refused.

We were curtly told that we must go under guard to Kobdo, the head of the district. This meant a journey of 250 miles across the Altai Mountains on a trail that, as we later learned, is not used by caravans in winter.

The journey took 12 days and was exceedingly difficult and unpleasant throughout. During one march of 20 miles we crossed four 9,000-foot passes, working steadily from 11 in the morning until 5 the following morning, and 20 of our 30 camels were down in the snow at one time.

It grew very cold during the latter part of the journey. We were forced to discard the tent, as there was almost no fuel of any kind and sleeping bags became so full of frost that they could not be used. There were yurts at intervals along the way, and we slept with the Mongols. This arrangement was unpleasant, but much warmer than the open air or our tent.

PREPARING FOR A SLEIGH RIDE WITH THE MERCURY AT 44 DEGREES BELOW ZERO

Permission had to be obtained from Moscow before the author was allowed to transport his motion-picture cameras, films, and binoculars through Siberia. While awaiting this permission he marked time at a little Siberian frontier town. Although the winter had hardly begun, constant subzero temperatures were experienced there.

At last we reached the small town and military post of Kobdo, where a garrison of 300 soldiers is maintained. We had hoped for release, but were still under suspicion. Four hours were spent trying to convince two young Mongols of the police that we were not spies. Each time that we informed them who and what we were they roughly told us that we lied, that we were spies and dangerous characters.

MERCURY FALLS BELOW THERMOMETER'S GAUGE

Finally another Mongol entered the yurt where our examination was being conducted. This man, a Buriat from southern Siberia, could read a certain amount of Russian, and, seeing our Russian letters, sent hurriedly for the governor general, the head of the district.

Unlike the other Mongols we had met, he had slightly more brains than a child. Also he was able to use them. He asked a few searching questions, seemed satisfied at our answers, and ordered us taken to the house of a Russian whom we had met on our way to Kobdo. He gave us his entire time during our stay in Kobdo, and through his help we reached the Russian consul.

This official induced the Mongols to return our confiscated arms and instruments, and did everything in his power to persuade them to allow us to continue to Ulyasutai and Urga. But permission was absolutely refused.

We decided, therefore, to take the most practicable route to Peking, which was by wagon and sleigh to a branch of the Trans-Siberian Railroad at Biisk, in Siberia, thence by rail to Manchuria and Peking. The Russian consul gave us visas and permits and arranged for the return of our men and camels to Turkestan.

Before reaching the railway, we encountered exceedingly cold weather, our registering thermometer sticking several times at 44° below zero. Peking was reached on New Year's Day, nine months after leaving Kashmir. We had traveled 7,900 miles across Asia, from the Indian Ocean to the Yellow Sea.

SICILY: ISLAND OF VIVID BEAUTY AND CRUMBLING GLORY

SICILY refuses to be considered merely in terms of the present. Go there, lured by the beauties of its craggy north coast, the charm of its rolling hills, its sunshine, its picturesque people, or its huge volcano; and Sicily's glorious and varied past quickly thrusts itself also into the picture.

The island stands to-day the product of a racial melting pot that has seethed for centuries. The story of this human caldron may be read in the faces of the people. For the most part the many racial strains have been merged, but now and then a type flashes as a challenge from the past. Here one sees the high brow and straight nose of a Greek; there the deep, dark eyes of a Saracen; yonder the fair hair of a Teuton.

When a Sicilian passes you to-day you may hear the footsteps of all the motley throng that has trod the shores of the island through thirty centuries.*

RUINS OF GREEK PERIOD ABOUND

More of Sicily's story is told in the signposts of stone from the past that one sees in rambling about the beautiful island. Scattered along its coasts, especially in the south and east, are the ruins of wonderful Greek temples, ranking with the architectural masterpieces of Greece itself. To the casual visitor from northern Europe or America, these magnificent relics of Greek civilization seem as incongruous as a Chinese pagoda in the heart of Africa. But they tell truly of the island's Golden Age, when Sicily, daughter of Greece, grew to a stature and a beauty that rivaled, if they did not actually surpass, those of the motherland.

Sicily is often pointed out on the map as the "football of Italy," lying at the toe of the Italian boot. Politically, the island only too truly has been the football of Europe, kicked through the centuries from sovereignty to sovereignty; the object of countless conquests; tossed now to one power, now to another, by tyrant, king, pope, and emperor. It has suffered incessant strife and repeated invasions, and the mixture of blood and customs that has come with them, so that it finds itself in certain difficulties to-day.

Potentially it is rich, the garden island of the Mediterranean; actually it is in large part a land of unprosperous peasants oppressed by absentee landlordism.

There has been a distinct tide in the affairs of Sicily. First the world grew to it; then far beyond it. When the curtain first rose on the drama of Europe, civilization and culture were concentrated in the eastern Mediterranean, in Greece and along the shores of Asia Minor and Syria. Sicily was a raw frontier land. But inevitably civilization was to move westward along the water highway that lay waiting.

A Greek Columbus of the day discovered Sicily and reported it sparsely settled; and soon "Going to Sicily" became a practice in the Greek world, as "Going to America" came to be an industry in Sicily 22 centuries later.*

Greece's new western world developed with a startling rapidity to be seen again in America. Within a century and a half Greek towns occupied sites all along the east and south coasts of Sicily; and Syracuse, greatest of them all, had become wealthy and powerful.

After another century it was the greatest city in all Hellas and perhaps in the world. In 415 B. C., even Athens was humbled in a war against this new Greek power of the West, and 7,000 Athenian captives, made slaves, were cast into the vast quarries of Syracuse to hew rock for its magnificent edifices, fragments of which remain to-day (see, also, Color Plate XIII).

By the time Syracuse had overtaken Athens, Carthage had arisen in northern Africa; Rome had extended her power in Italy; the Greek world still dominated the East, and colonies were thriving in southern France and Spain. The Mediterranean and its shores were the civilized

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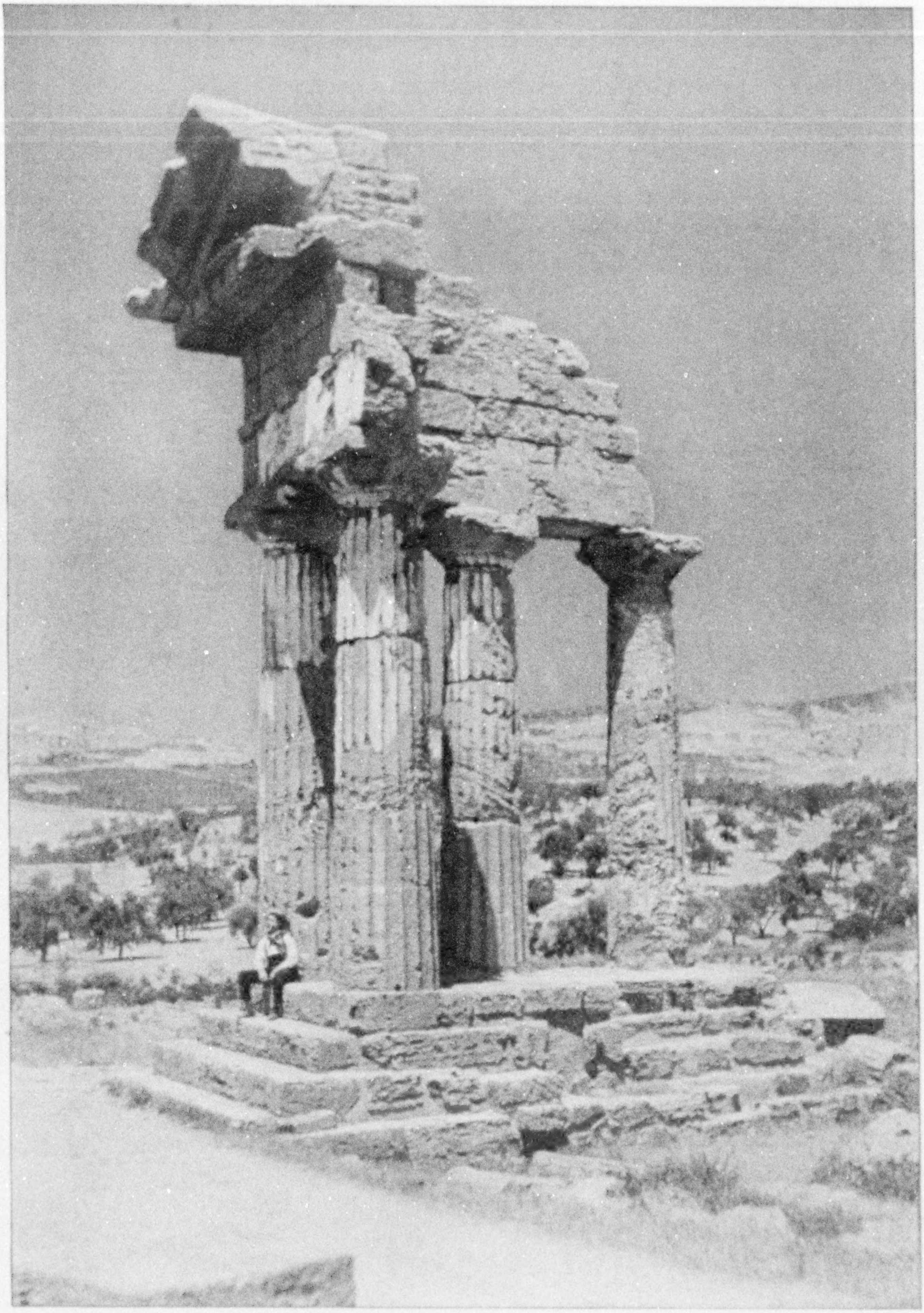
* See, also, "Zigzagging Across Sicily," by Melville Chater, in the NATIONAL GEOGRAPHIC MAGAZINE for September, 1924.

* See, also, "A Country Where Going to America Is an Industry," by Arthur H. Warner, in the NATIONAL GEOGRAPHIC MAGAZINE for December, 1909.



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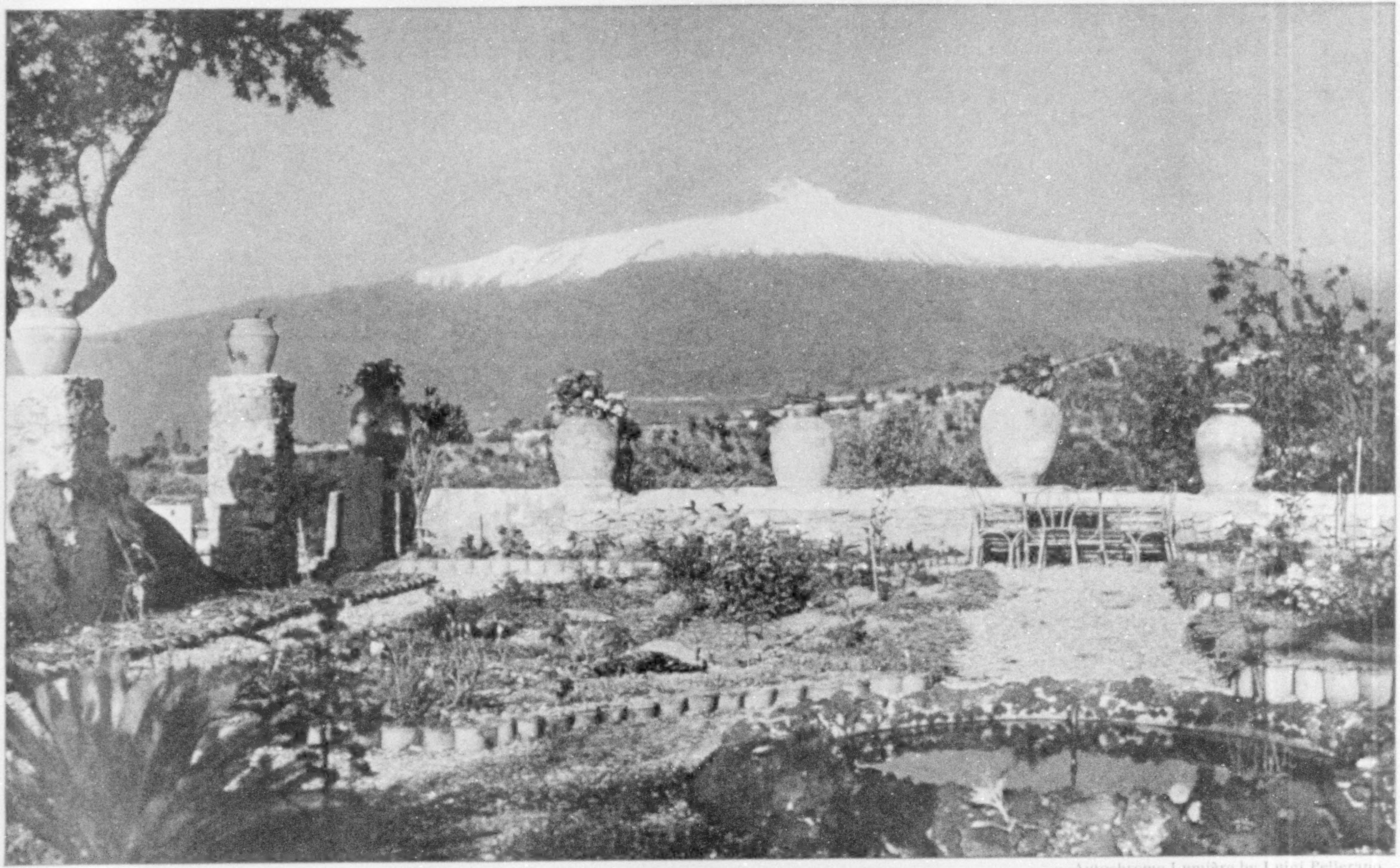
ONLY A FRAGMENT REMAINS OF THIS SHRINE TO THE HEAVENLY TWINS

The ruins of the Temple to Castor and Pollux, twin patrons of sport and hospitality, near Girgenti, stand where there once was a busy and beautiful city. Plato remarked that its people "built as though never expecting to die and feasted as if they had only an hour to live" (see also Color Plates VIII, XIV, and XV).



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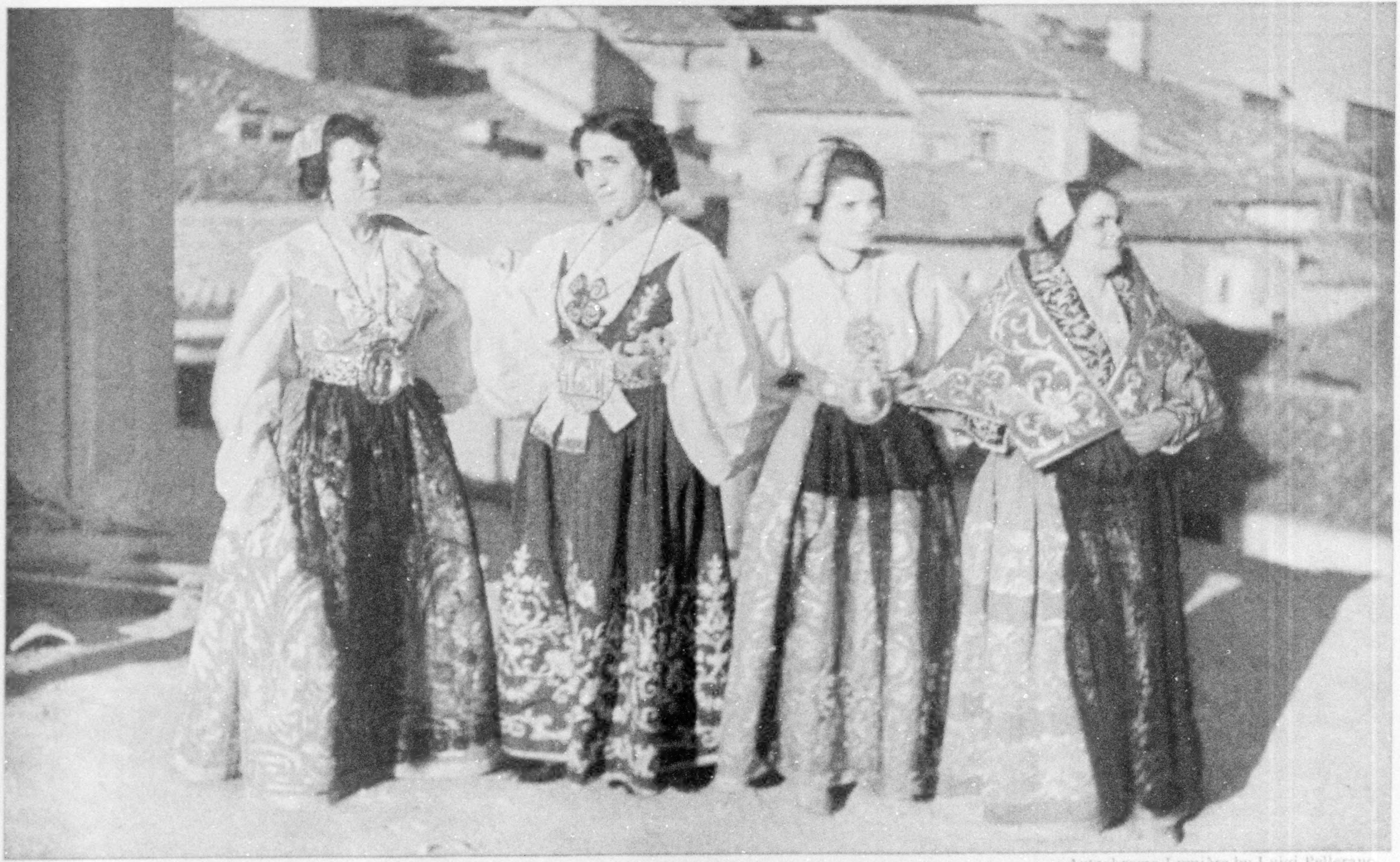
MOUNT ETNA DOMINATES THE SICILIAN LANDSCAPE

At the volcano's sprawling base lie pastoral groves of figs, olives, grapes and almonds. Encircling its huge girth is a timber belt which tapers off into a crown of scoriæ and ashes, snow-clad most of the year. A wind-blown plume of smoke waves unceasingly above. The garden belongs to a hotel in Taormina (see also Color Plate IX), which once was a convent.



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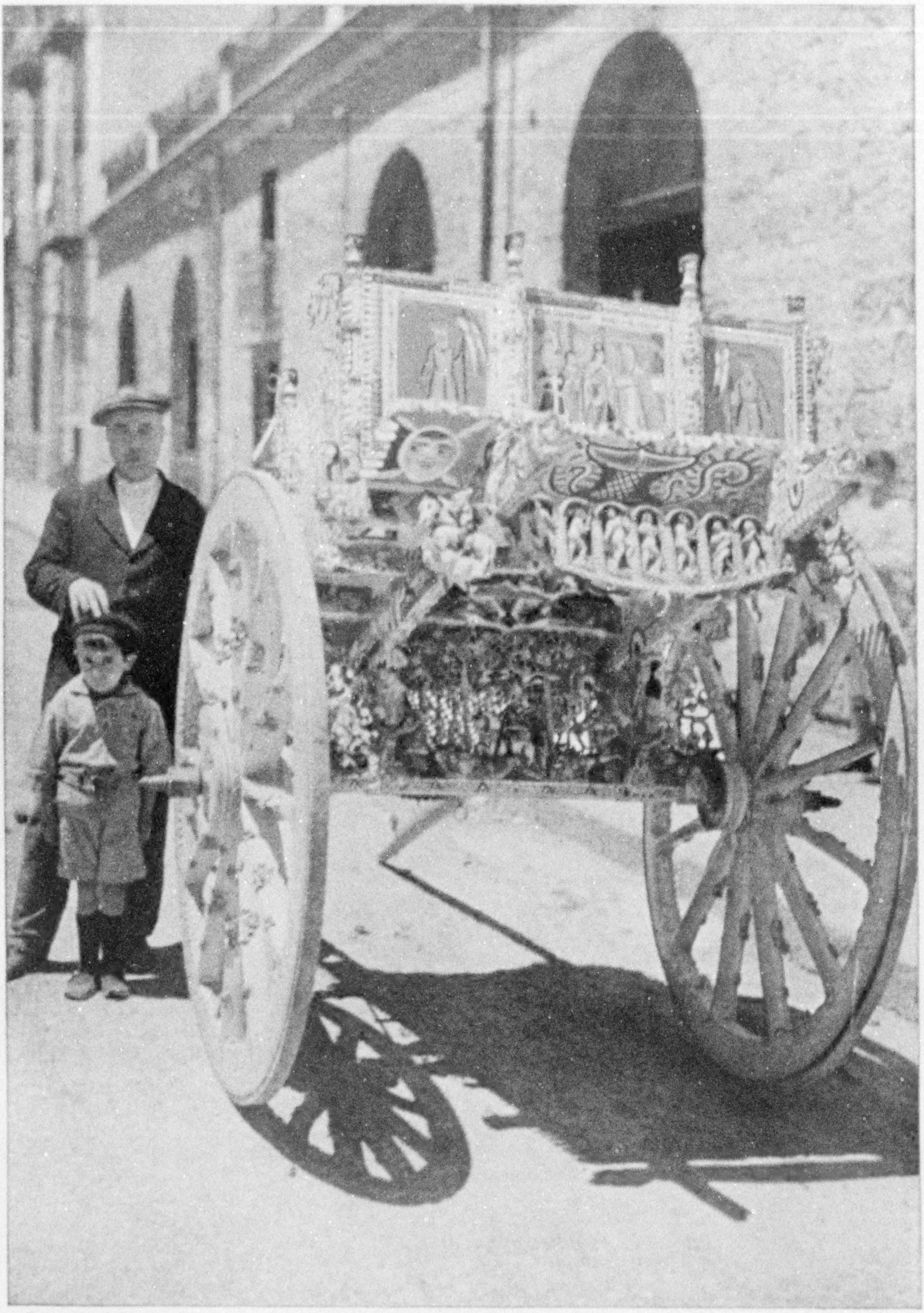
PROUD POSSESSORS OF THE MOST COLORFUL COSTUMES IN SICILY

The villagers of Piana dei Greci are direct descendants of Albanian Greek settlers at a period when Sicily offered a sanctuary from Turkish oppression. On festival days the women wear costumes that were fashionable in Albania 500 years ago. Sicily shelters remnants of ancient peoples and old customs that the mainland long ago obliterated or modified (see also Color Plate XI).



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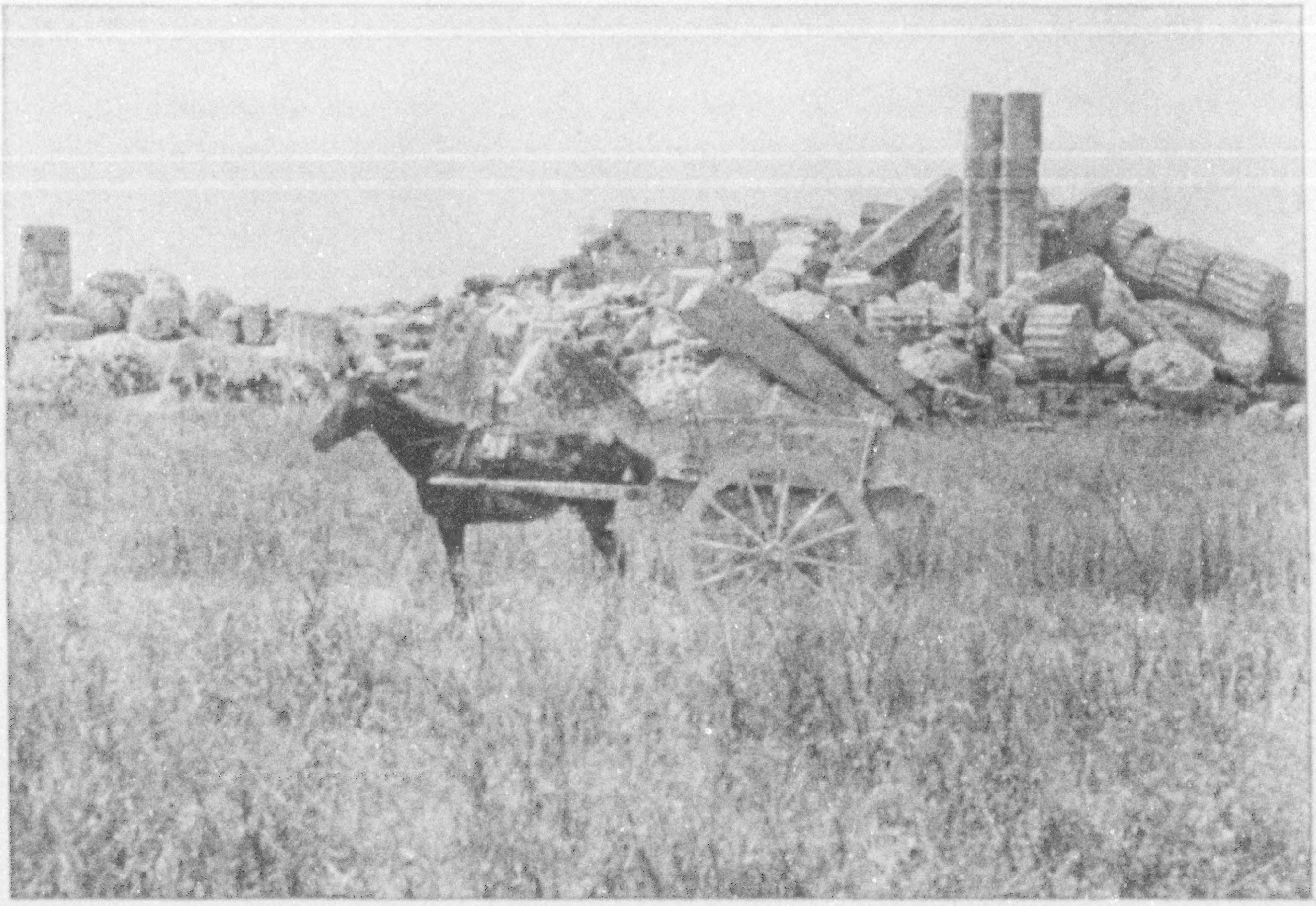
A VERITABLE PICTURE GALLERY ON WHEELS

The body of this Sicilian cart is distinguished by its peculiar, elaborate decoration. On a background of lemon yellow are pictured fruits and flowers, famous battles, and scenes from the lives of the Saints.



A TOUCH OF MODERN SICILY AGAINST A BACKGROUND OF HER CRUMBLING, ANCIENT GLORY

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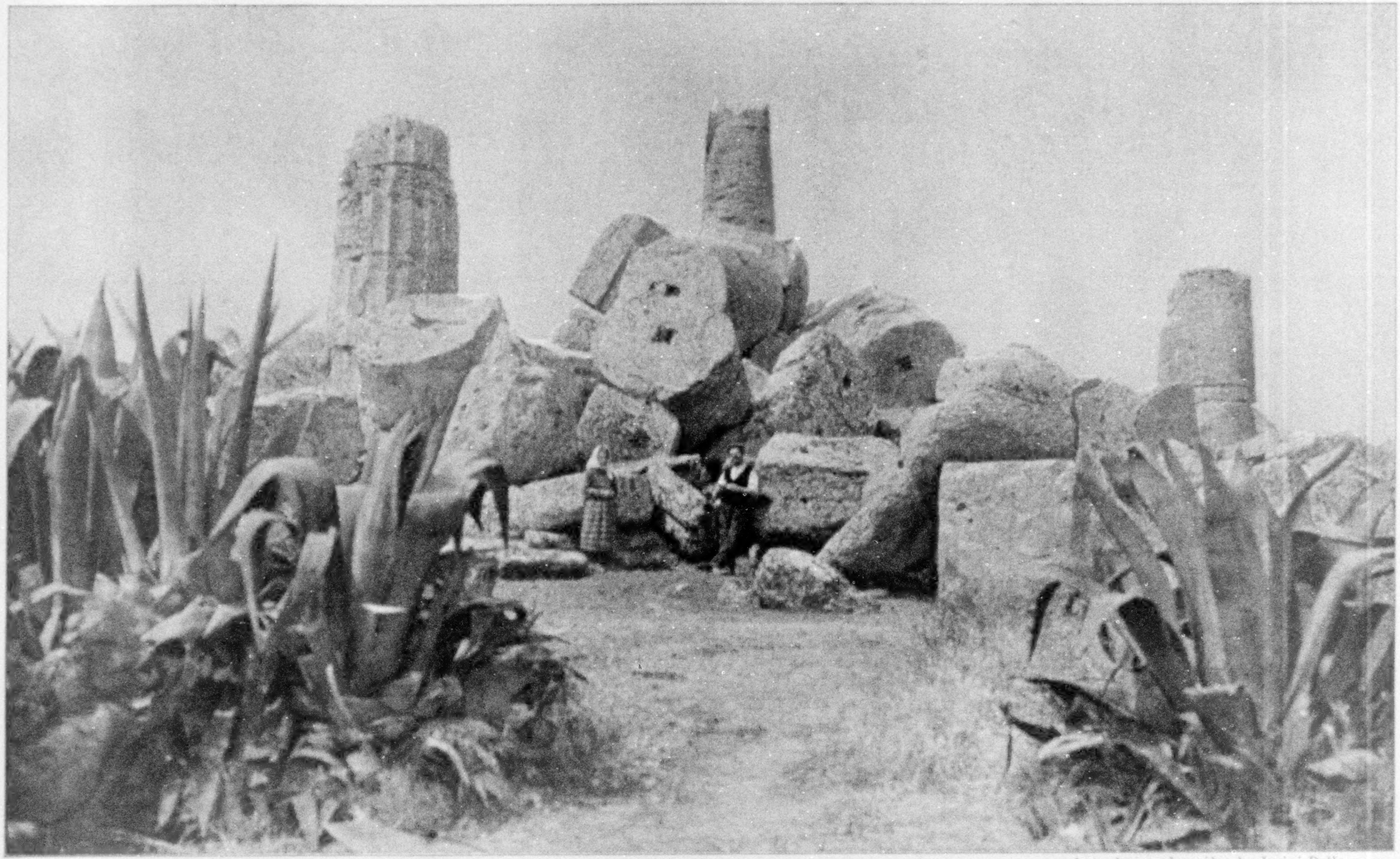
A FAMILY HEIRLOOM

These bizarre carts are built of oak, and the designs are in metal work. Even the wheels and the shafts are profusely decorated. New models are not in demand; the vehicles are handed down from father to son.



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NATURE DESTROYED IN A MOMENT WHAT MEN BELIEVED WOULD STAND FOR ALL TIME

This temple to Apollo at Selinus was built in the days when the coast of Sicily was an outpost of the Greek world. The edifice was longer than, and approximately as wide as the central part of the United States Capitol Building. An earthquake demolished it.

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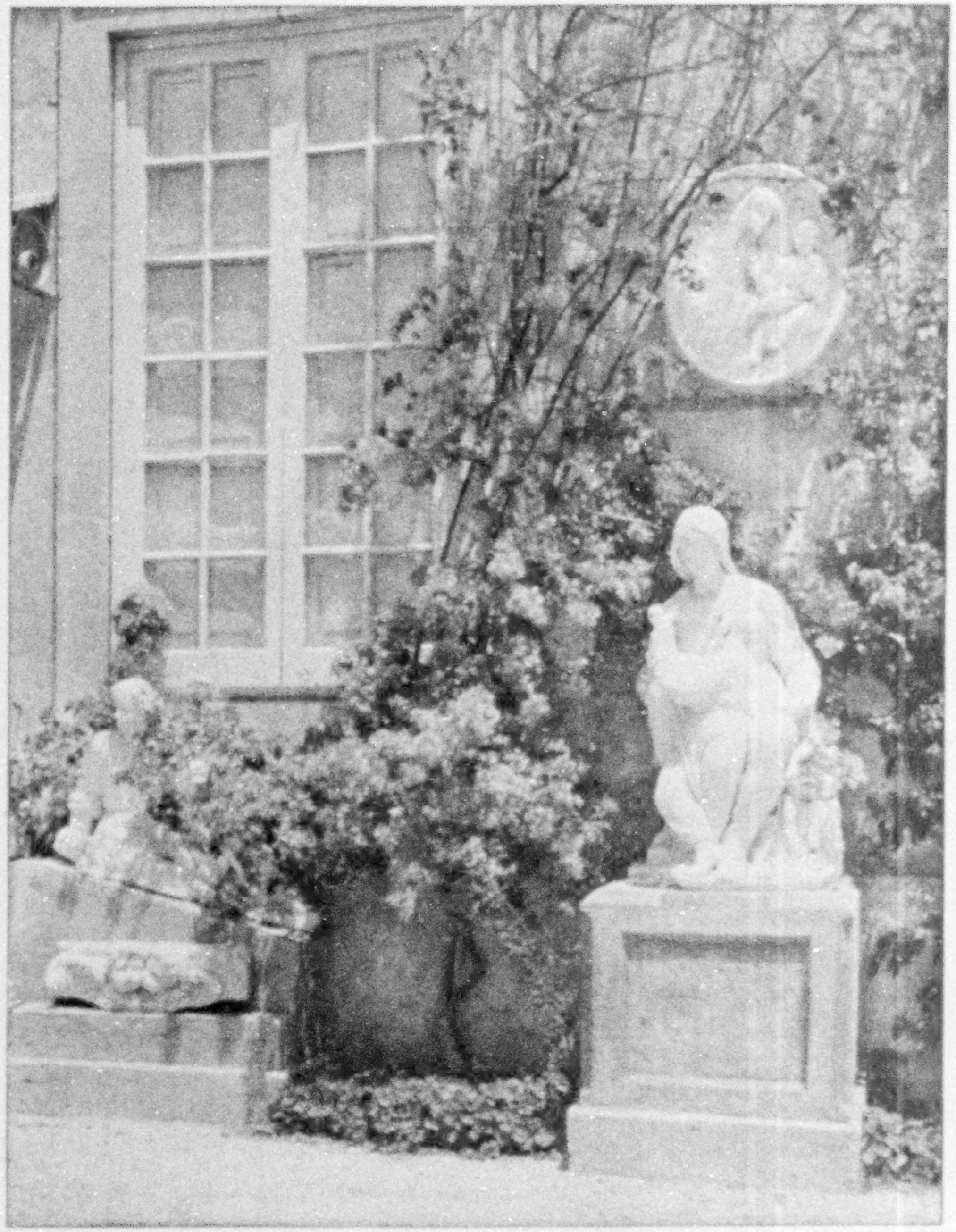
BEAUTY AND THE PAST

The young Sicilian woman sits among the pillars of an ancient cloister church of Palermo, a city that has seen races come and go since it was a Phoenician port.



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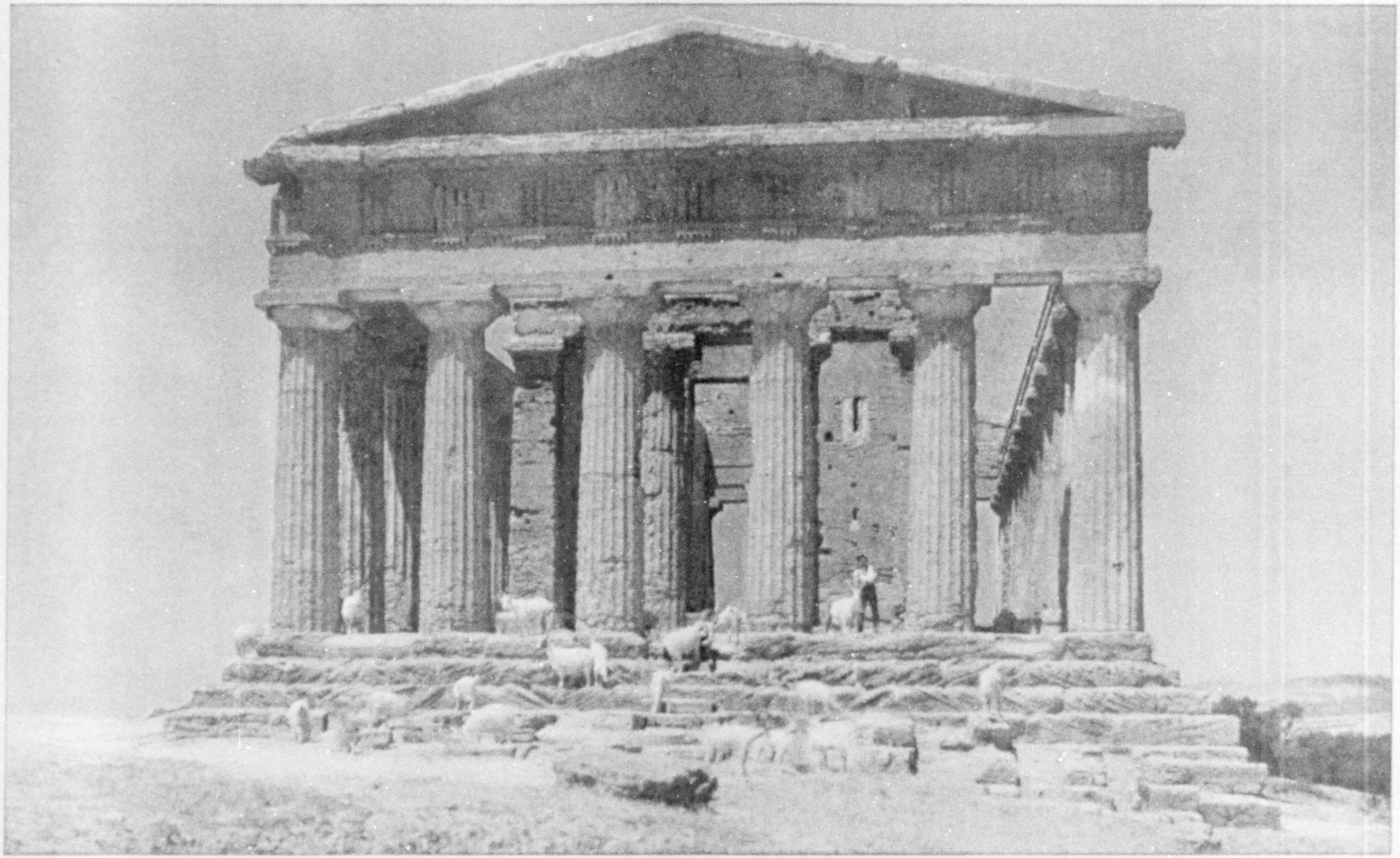
RELICS RECOVERED FROM THE EARTHQUAKE OF 1908

That catastrophe, called "The World's Most Cruel Earthquake," destroyed Messina, claiming approximately 100,000 human lives. A temporary museum houses some of the art objects recovered from the débris.



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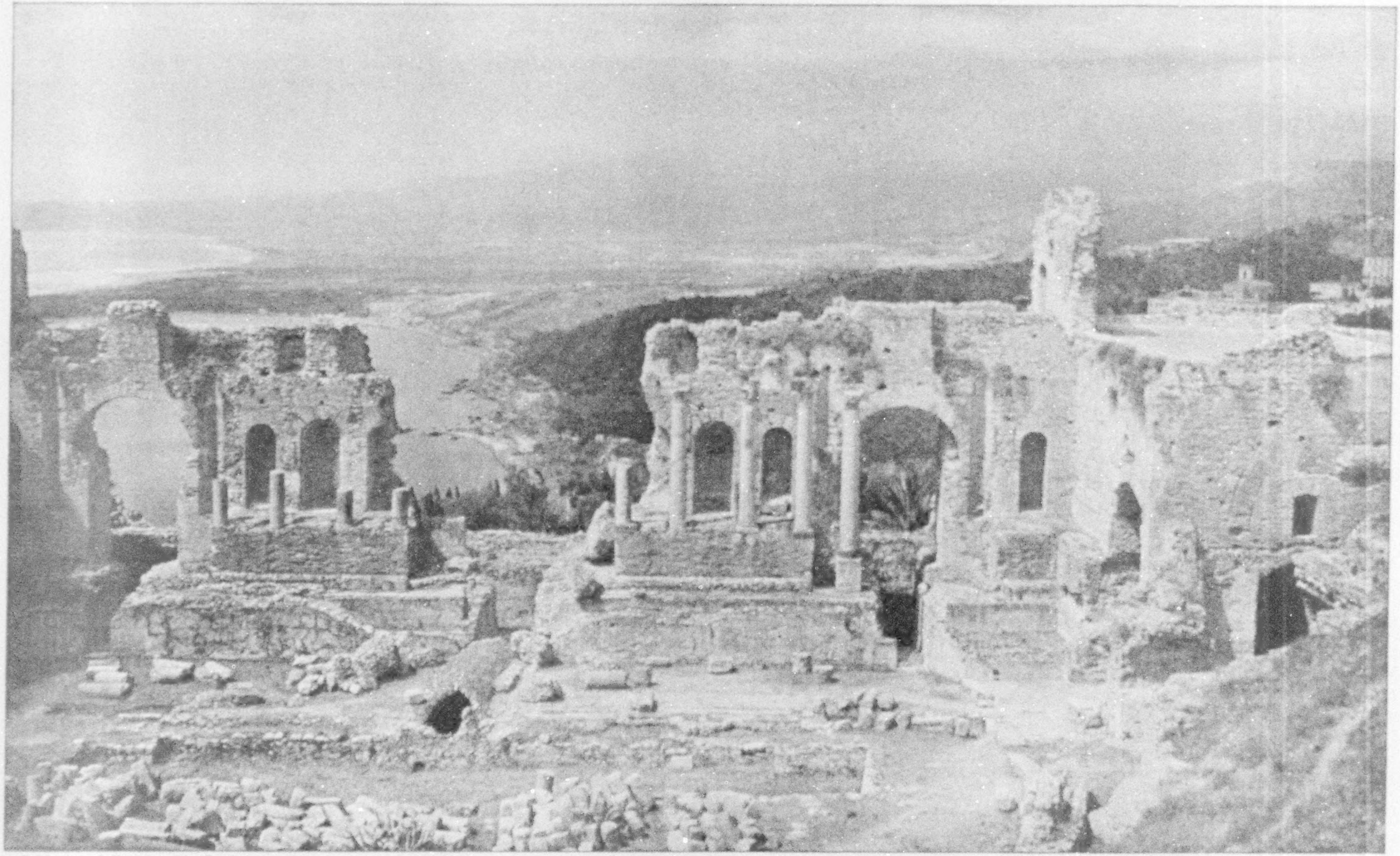
AN INSPIRING RUIN OF THE ANCIENT HELLENIC WORLD

This little gem of Doric architecture, the Temple of Concord at Girgenti, was one of a series of temples that were among the crowning glories of ancient Akragas (see also Color Plates I, XIV, and XV). Its escape from destruction is thought due to the fact that it was adopted as a shrine by Saint Gregory of the Turnips, thus becoming a Christian sanctuary.



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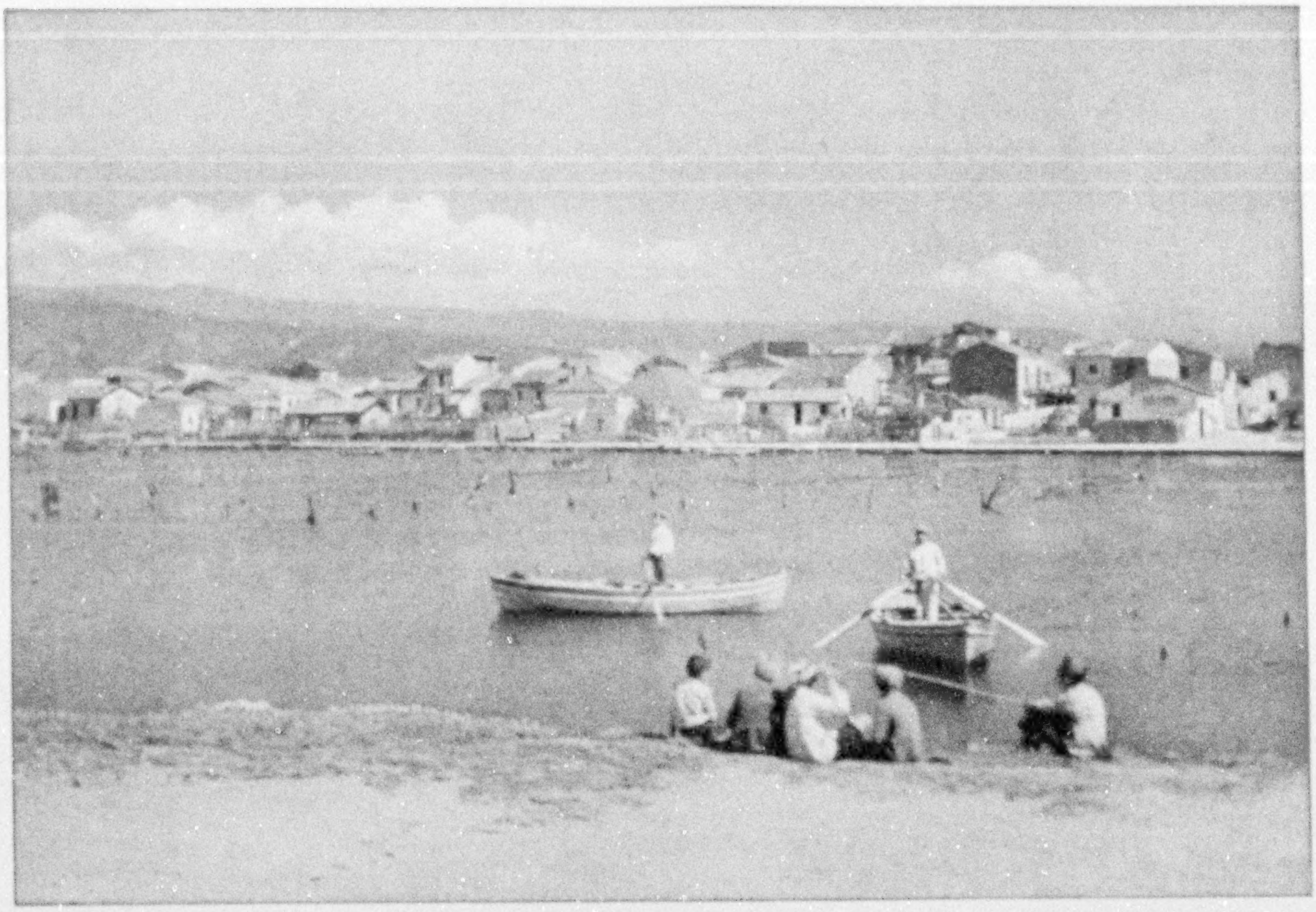
THROUGH BROKEN ARCHES OF THE GREEK THEATER AT TAORMINA

These ruins saw "first showings in Sicily" of dramas by Sophocles, Euripides and other playwrights whose plays still are produced in the Strand and on Broadway. They are a 23-centuries old token of the intellectual life of the island when Simonides visited it, Pindar wrote lyrics about it, and Archimedes worked there with his levers and pulleys.



SICILIAN SONS OF NEPTUNE

One of the many little villages that dot the coast of Sicily. From all of them small fishing boats fare far into the Mediterranean and cruise up and down the North African coasts.

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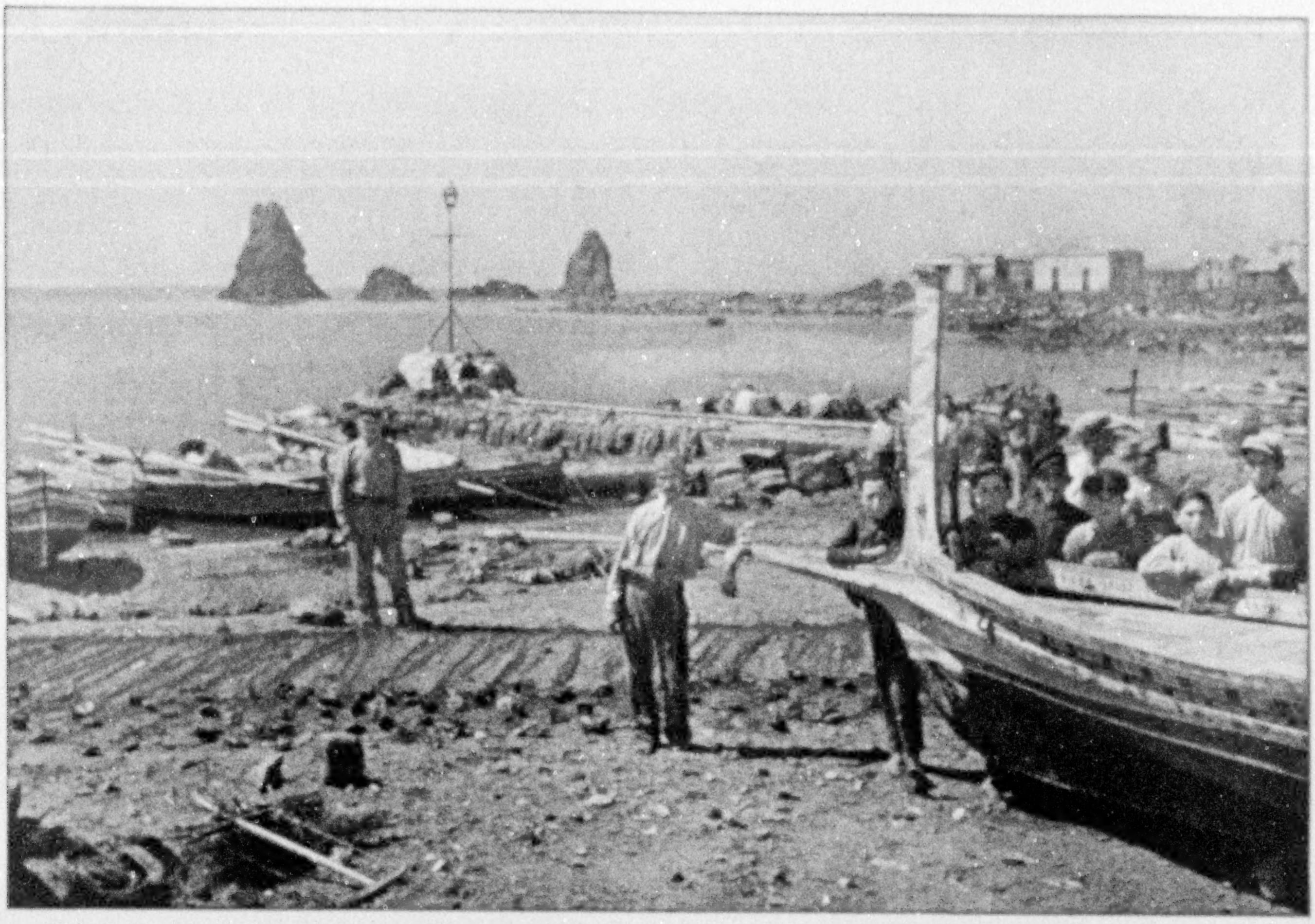
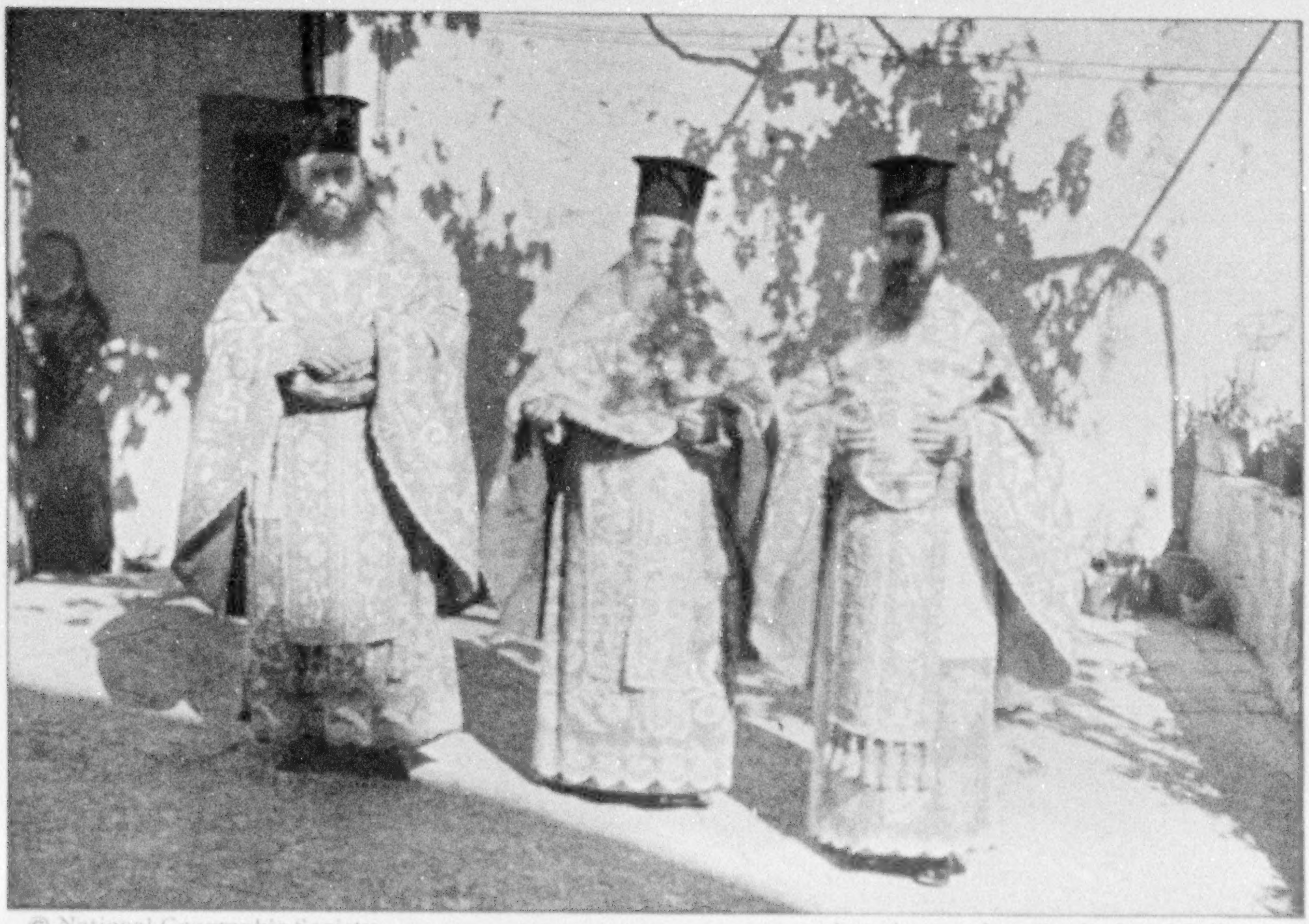
FOLK OF THE COUNTRYSIDE NEAR SYRACUSE

Sicily is not a rich country and her peasant people, while often surrounded with ruins and relics of ancient grandeur, have a hard struggle to provide a living for themselves and their numerous children. "Going to America" for many years was a major industry.



THESE FISHERMEN MODEL THEIR BOATS AFTER THEIR QUARRY

The long, pointed prow of this craft resembles the head of the swordfish which it pursues. These fish are caught in the Strait of Messina, and their flesh is esteemed a delicacy there as here.



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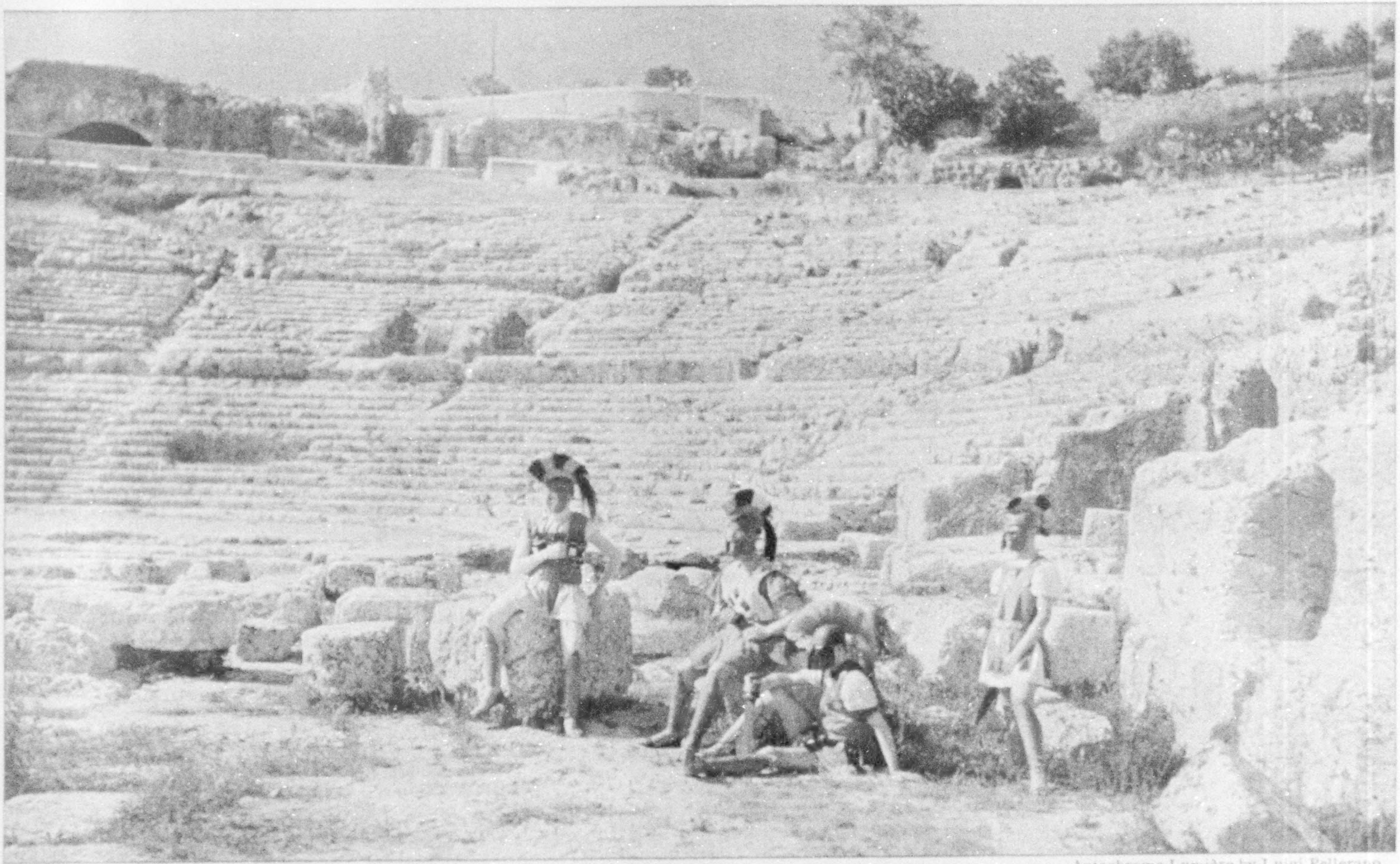
PRIESTS OF THE GREEK CHURCH

The tenacity with which the Albanian Greeks have maintained their identity and customs in Sicily has been due largely to the influence of the priests of the Orthodox Church (see also Color Plate III).



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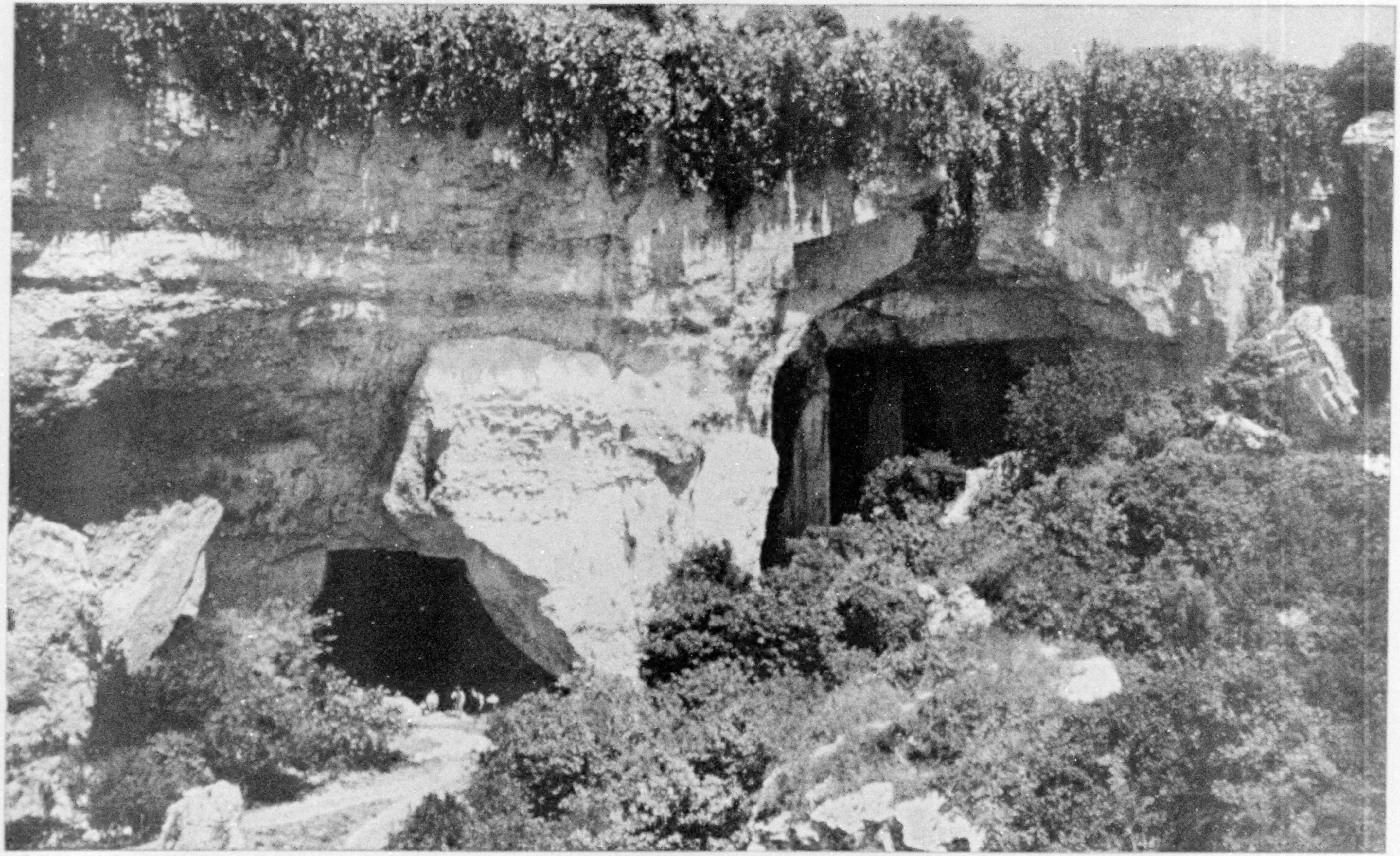
MODERN SICILIANS SOMETIMES RE-ENACT THE DRAMAS OF THE PAST

The Greek theater at Syracuse still serves as a reminder of the glory of Grecian times. The city, founded more than 2600 years ago, was the Athens of Sicily during the Greek period.



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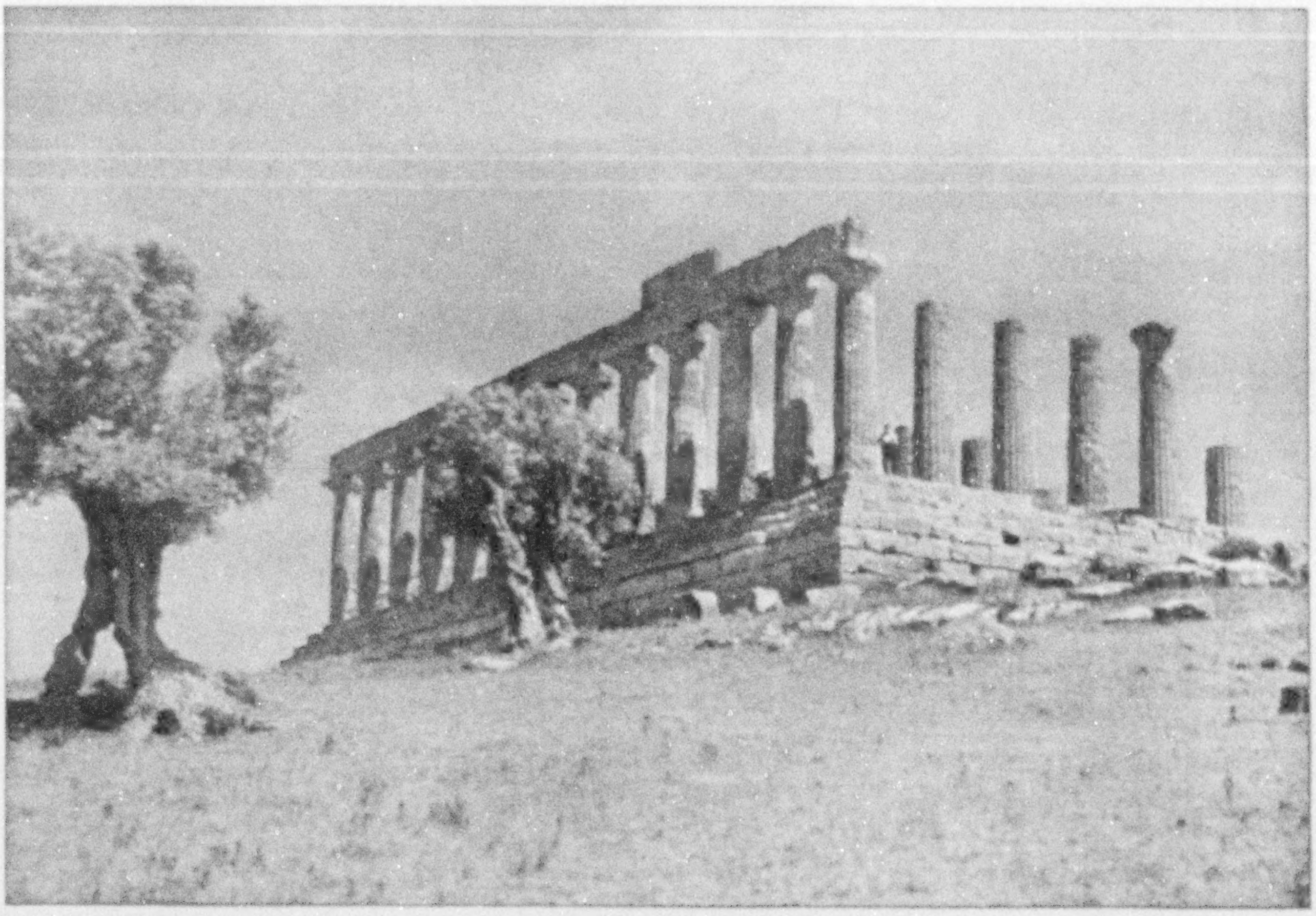
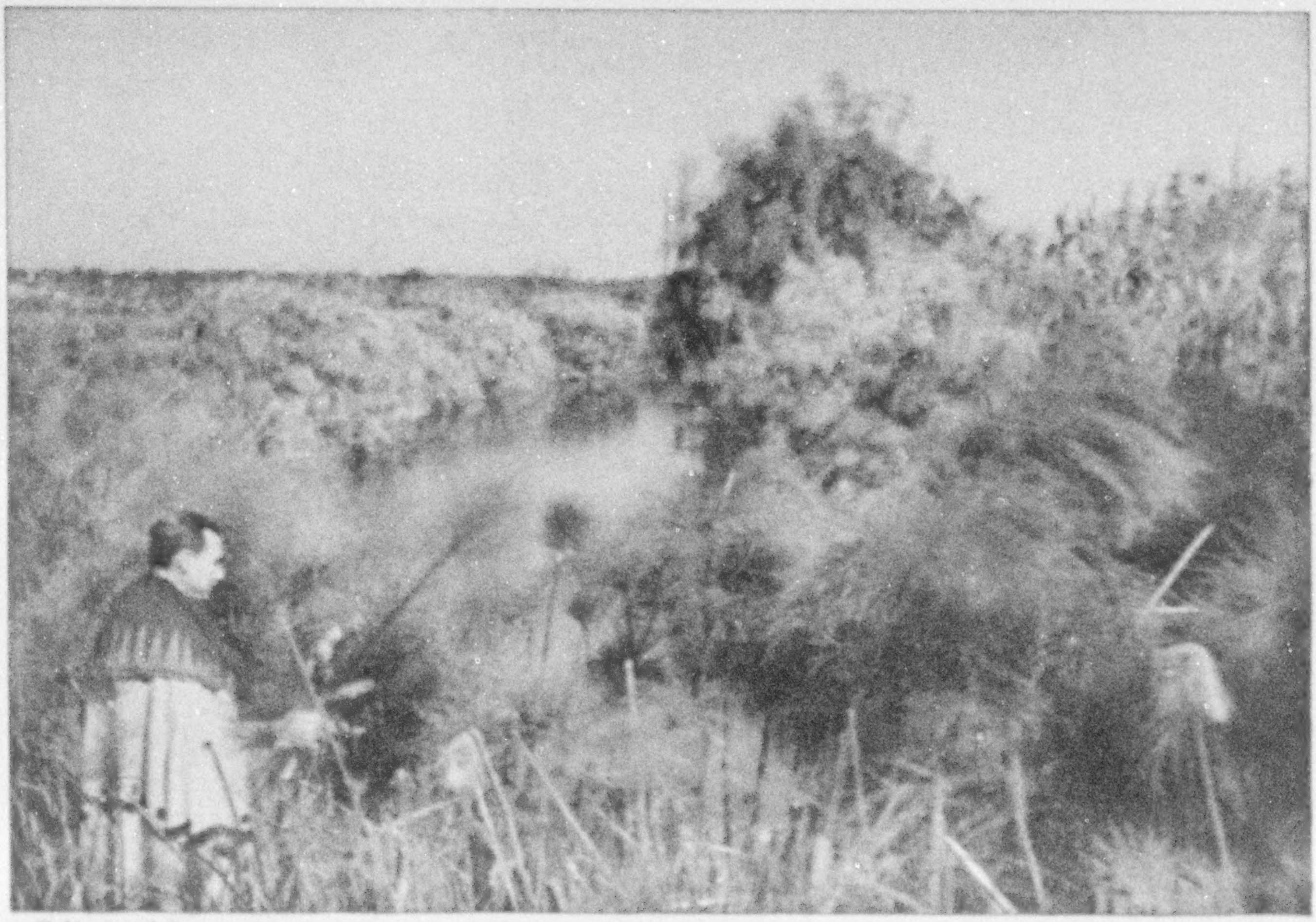
THE ANCIENT QUARRIES OF SYRACUSE

Many of these quarries in the vicinity of Syracuse lend themselves to park and garden purposes. This grotto, before the entrance to which several men are standing, has also been used in modern times as a rope factory.



THE QUEEN OF THE GODS WAS WORSHIPED HERE

The Temple of Juno, near the Temple of Concord at Girgenti (see also Color Plate VIII), reminds one of the Parthenon isolated in a sylvan setting.



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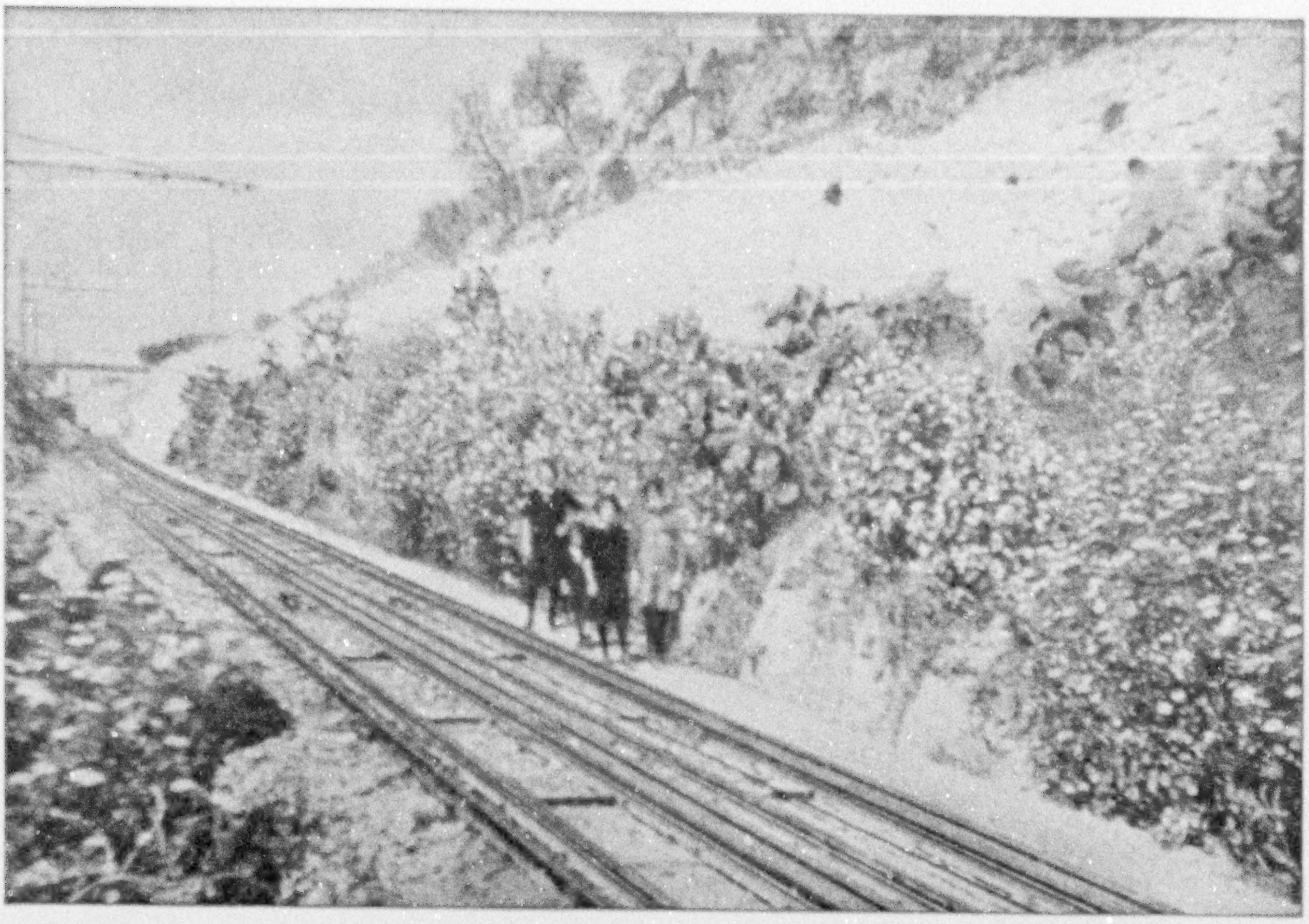
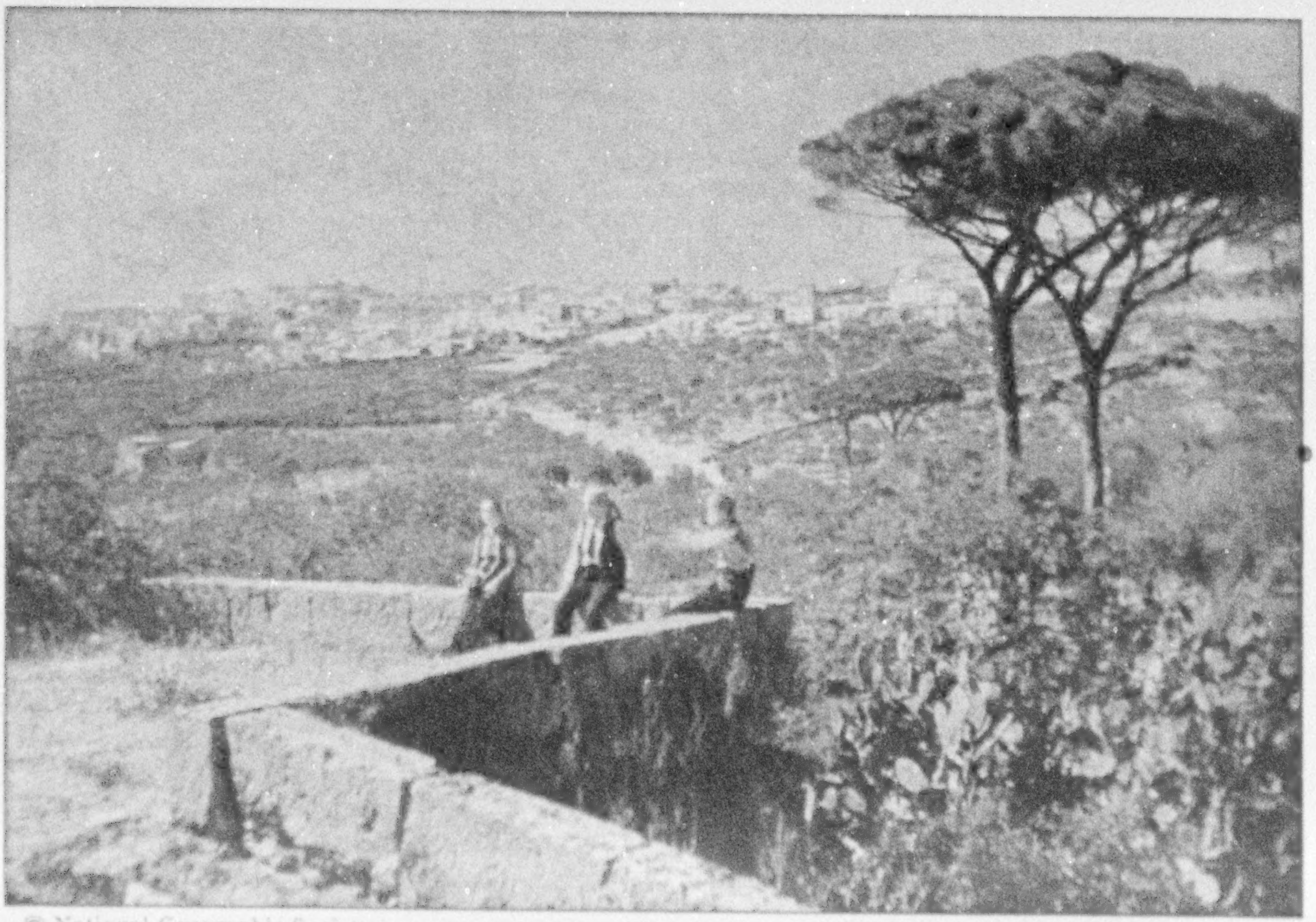
WHERE THE "PAPER PLANT" GROWS WILD

The only place in Europe where the papyrus grows wild is along the edges of the Ciani River near Syracuse. It was introduced there by the Arabs centuries ago.



FLOWERS ADORN THE RAILWAY FROM PALERMO TO MONREALE

Hedges of geranium and prickly pear are planted along the railways of Sicily. This line leads to the famous cathedral at Monreale.



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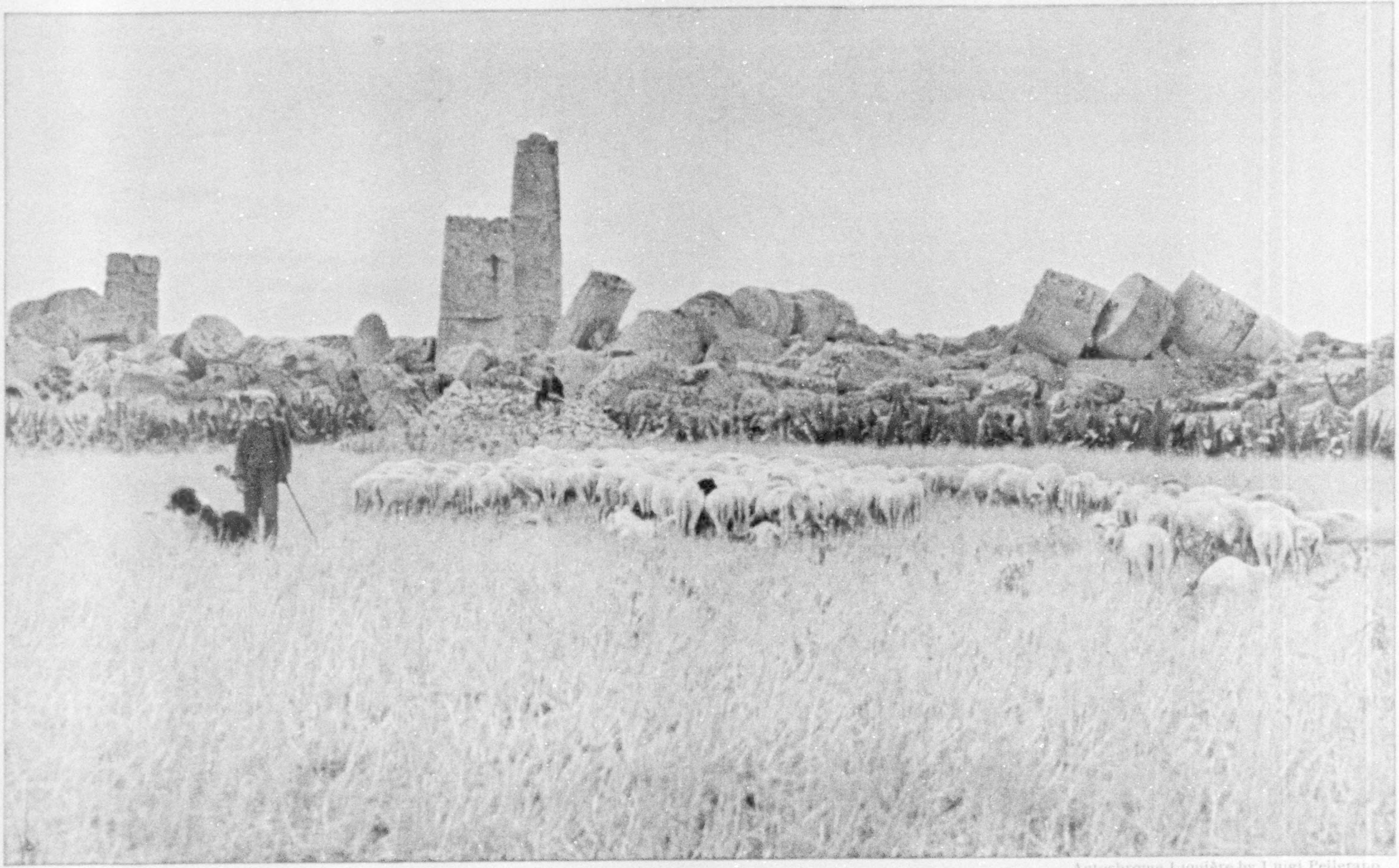
A CITY FALLEN FROM HIGH ESTATE

Girgenti, now a rather squalid city, once was Akragas to the Greeks, and later was Agrigentum to the Romans. It once was termed "the most beautiful town of the mortals."



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FLOCKS BROWSE BESIDE THE SUN GOD'S FALLEN TEMPLE AT SELINUS (SEE COLOR PLATE VI) world; and at its very heart lay Sicily, with her powerful Greek cities. This was the Golden Age of Sicily; and when civilization spread over western Europe and even leaped the Atlantic, Sicily's glory waned.

During Sicily's brightest era Syracuse, the metropolis, had nearly a million inhabitants. Akragas, of which the modern Girgenti is the remnant, was only slightly smaller, and perhaps even surpassed Syracuse in wealth. Pindar called it "the fairest of mortal cities." Selinus, Katane (modern Catania), and Zankle (Messina to-day) were other rich Greek cities whose former glories survive to-day in the simple, matchless beauty of their ruined temples and theaters (see, also, Color Plates I, VII, VIII, IX, and XII).

ISLAND WAS CORNERSTONE OF ROMAN EMPIRE

Later Sicily became the cornerstone of Roman power, the first territory outside the Italian peninsula to become subject to Rome. On this Sicilian foundation rose the far-flung empire that for centuries embraced the entire civilized world.

When Rome became mistress of Sicily the entire population of the island, save in the Carthaginian corner, had a Greek character. But under Roman rule the dominant Greek strain was altered. For hundreds of years slaves were dumped into Sicily from conquests in all parts of the growing empire. The cities dwindled; the country became merely Rome's granary, its fields tilled by a polyglot horde under cruel taskmasters.

In the succeeding centuries came many strains to enter the already complex stream in Sicilian veins. The Goths and Vandals brought German blood. The Saracens of Africa swarmed over and made Sicily, like Spain, a Moslem stronghold. Normans followed; and then Sicily passed dizzily from people to people: German, French, Spanish. The Spanish Bourbon era came to an end only in 1861, when Garibaldi liberated the island and it passed to the new kingdom of Italy. Alien rulers often neglected or misgoverned it, and to that fact it owes most of its modern poverty.

Sicily to-day, as during most of its past, is predominantly agricultural; but it is neither a land of farmhouses nor farm villages. In the interior one passes field after field without habitations. During certain seasons it is almost as if one were traversing an abandoned land. Many farmers travel as much as five or six miles twice each day between their plots and the sizable towns in which they live. Doubtless this custom arose as a protective measure, an outgrowth of Bourbon times, when the people, ground down and discouraged, turned to brigandage by the thousands.

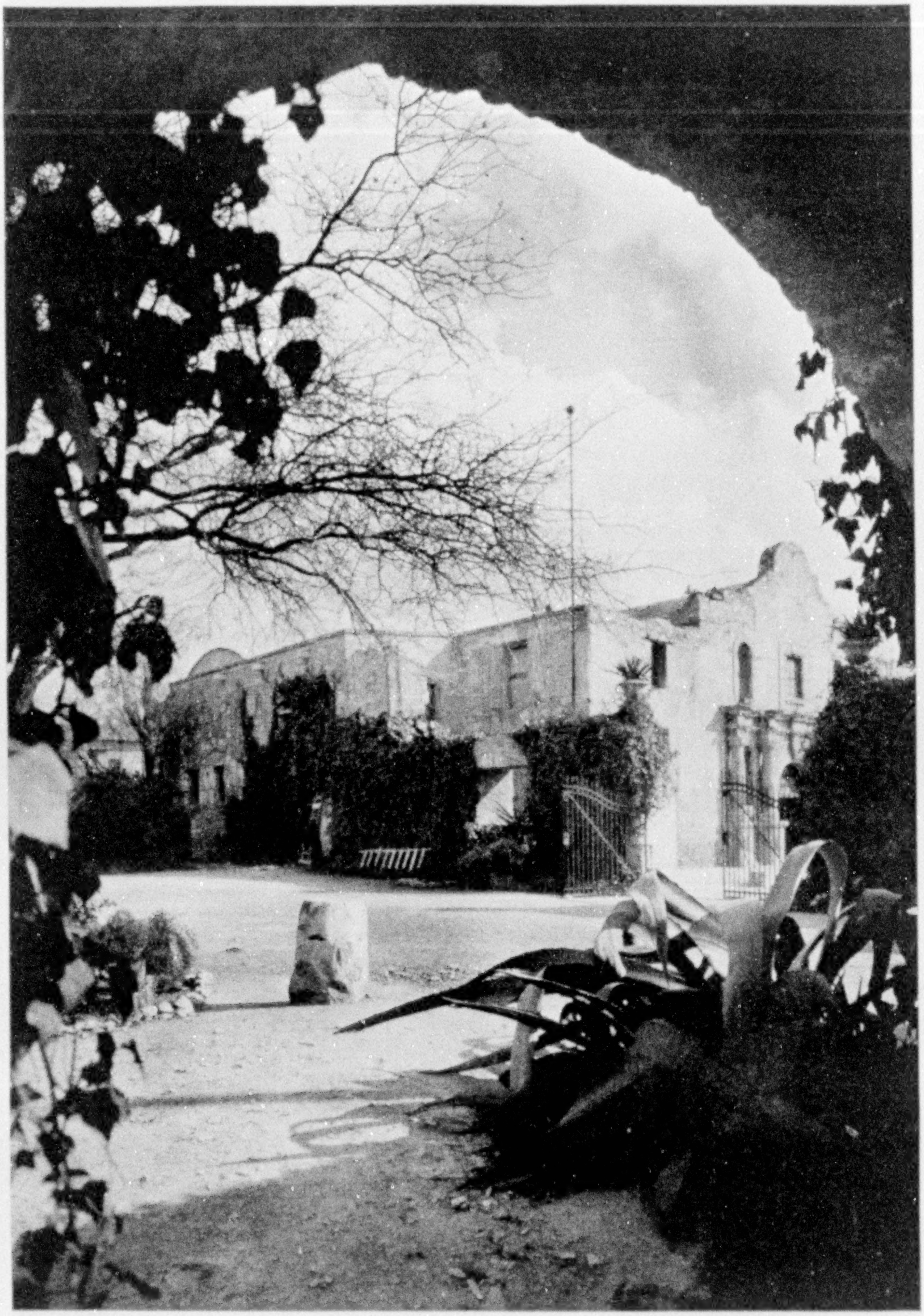
Population has steadily increased in Sicily until now the island's inhabitants number more than four million. This population pressure, combined with the burdens of the land system, caused thousands of Sicilians to stream to the United States before the immigration restrictions were adopted. Now this outlet has been closed, and as a result Sicily's population is piling up more rapidly than ever before.

American developments have created two more problems for Sicily in recent years. All over the island lemons are produced, and, in the past, millions have found a market in the United States. With the growth of the lemon industry in California, Florida, and Texas, the American demand for Sicilian lemons has been greatly reduced and prices have fallen. Sicily has solved this problem in part by manufacturing more of its lemons into citrate of lime and lemon oil.

CHILDREN HELP EXTRACT LEMON JUICE

In the lemon-growing districts one may see hundreds of women, girls, and boys at tables plying their knives and deftly separating the pulp of the fruit from the rinds. The pulp is fed into presses for the extraction of the juice, while other workers press the rinds with sponges in wooden bowls, thus at a single operation expressing and collecting the aromatic oil.

America's third economic effect on Italy has been in the realm of sulphur. For many generations Sicily's volcano-created mines were the world's chief source of sulphur, and in recent times it actually produced 95 per cent of the entire world output. Since the growth of the sulphur industry in Louisiana and Texas, Sicily has steadily lost ground in the world's sulphur markets.



Photograph by Harvey Patteson

TEXAS SCHOOL CHILDREN ARE TAUGHT TO "REMEMBER THE ALAMO"

This old mission structure at San Antonio was the cradle of Lone Star liberty. Here for 12 days, in 1836, about 175 gallant Americans, including Davy Crockett, defended themselves to the last man against an overpowering Mexican force which fought under Santa Anna. Today the Alamo houses an interesting collection of relics of Texas' war for independence.

HOW LATIN AMERICA LOOKS FROM THE AIR

U. S. Army Airplanes Hurdle the High Andes, Brave Brazil Jungles, and Follow Smoking Volcanoes to Map New Sky Paths Around South America

By Major Herbert A. Dargue*

U. S. Army Air Corps, Flight Commander

SINCE the golden age of Pizarro and Magellan, of Sir Francis Drake and bold buccaneers of the Spanish Main, adventurers from the Seven Seas have scattered their bones along Aztec and Inca trails from Mexico to the Horn. In all the eventful annals of exploration, no other land ever excited men's imaginations more than has this vast and still only partially known area which we call Latin America.

First came the halcyon days of Columbus, Cortez, and Balboa, bearded men in armor, with the Cross in one hand and a Toledo blade in the other—daring days of incomparable achievement, when a few score Spaniards with courage and craft conquered the far-flung Montezuma Empire, and hordes of Indians threw away their spears and ran from the frightful, centaurian aspect of men on horses.

Then another age of adventure and roughhewn romance that saw whaling fleets and gold-mad California treasure-seekers rounding the cold, stormy Horn or seeking a short cut to fortune through the jungled gates of Panama.

Now our own day of exploration, with its restless quest for mines, ranches, raw materials, railroad rights, and oil fields—a quest that sends thousands adventuring, from the Rio Grande down to Patagonia, building up a great mutual commerce, helping Latin America develop its own rich resources, and finding a market here for its own surplus products.

But adventure always and the romantic lure of that ever-amazing Latin America—a kingdom of contrasts between icy peaks and humid jungles, between grass huts of savages and marble palaces of classic cities old in culture; a beckoning land, inviting exploration now just as when Columbus came; a challenging land, with little-known, uninhabited regions, perilous to fly over, waiting now to be discovered from the air by the winged *Pintas, Niñas,* and *Santa Marías* of today.

GAS-BURNING DOVES OF PEACE START LONG FLIGHT

So I was happy when told I should take an airplane and fly 22,000 miles, from Texas down to Patagonia and back; from Texas, by air, over the pagan Toltec Trail, past smoking Central American volcanoes; over the tombs and ruined cities of the Anáhuacs and Incas; down the faraway coast of distant Chile; up among the clouds and giant condors of the high Andes; out across the wide, flat pampas; up the long, lonely, jungle-lined shores of Brazil, and then home across the friendly blue water and green isles of the Caribbean, blazing a new trail in the conquest of the air (see map, page 452).

The Pan American Good Will Flight, this long air voyage was called, and the fleet of U. S. Army planes under my command were sent to carry friendly greetings from Uncle Sam to twenty nations of Latin America, stretching from Mexico down to Argentina.

Roaring up from Kelly Field on the morning of December 21, 1926, circling over San Antonio and the old Alamo in the clear, bright air of Texas, we pointed our amphibian noses boldly toward Cape Horn, waved adieu to cheering friends, and were off on the first aërial circumnavigation of the Southern Continent ever attempted.

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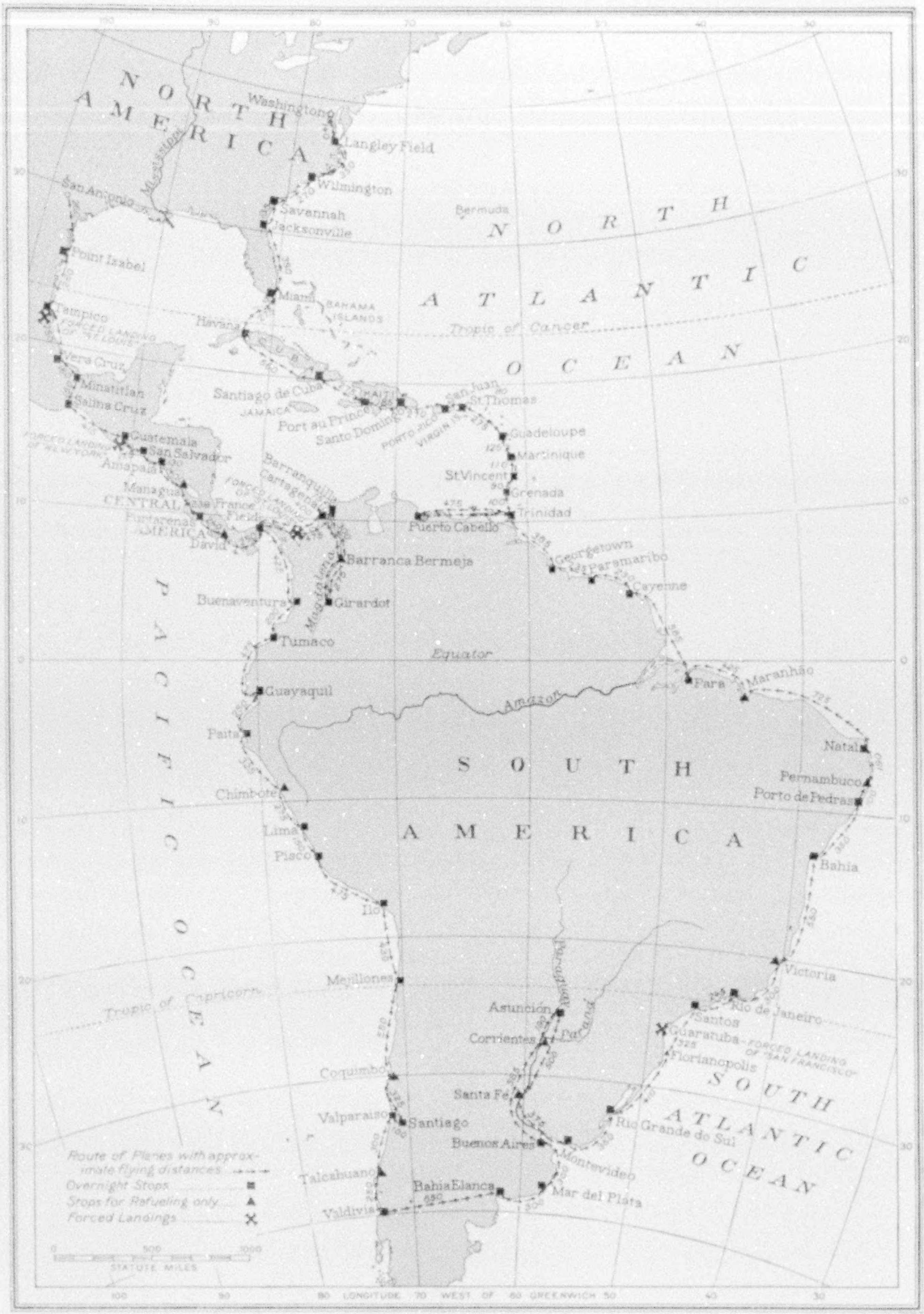
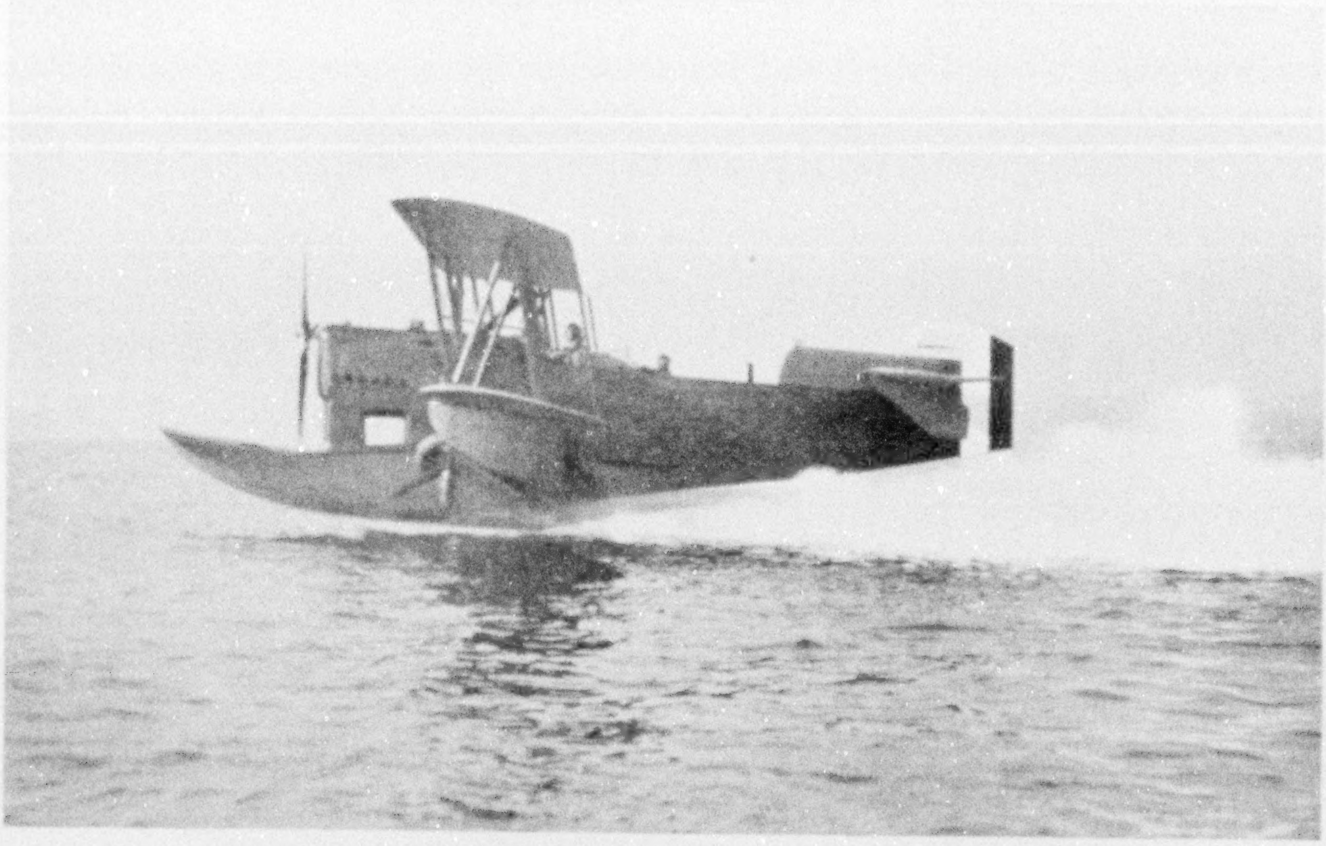
* The author wishes to acknowledge his indebtedness to all members of the Pan American Flight for data taken from their journals, especially to Capt. Ira C. Eaker, the official historian of the flight, and Frederick Simpich.


NORTH AMERICA
Washington
Langley Field
Wilmington
Savannah
Jacksonville
Miami
BAHAMA ISLANDS
Havana
CUBA
Mississippi
San Antonio
Point Isabel
Tampico
FORCED LANDING OF "ST. LOUIS"
Vera Cruz
Minatitlan
Salina Cruz
FORCED LANDING OF "NEW YORK"
Guatemala
San Salvador
Amapala
Managua
CENTRAL AMERICA
Puntarenas
France Field
David
Barranquilla
Cartagena
FORCED LANDING OF "ST. LOUIS"
Santiago de Cuba
JAMAICA
HAITI
Port au Prince
Santo Domingo
PORTO RICO
San Juan
St. Thomas
VIRGIN IS.
Bermuda
NORTH ATLANTIC OCEAN
Tropic of Cancer
Guadeloupe
Martinique
St. Vincent
Grenada
Trinidad
Puerto Cabello
Georgetown
Paramaribo
Cayenne
Barranca Bermeja
Magdalena
Buenaventura
Girardot
Tumaco
Equator
Amazon
Para
Maranhão
Guayaquil
Paita
Chimbote
Lima
Pisco
Ilo
SOUTH AMERICA
Natal
Pernambuco
Porto de Pedras
Bahia
Victoria
Rio de Janeiro
Santos
Guaratuba
FORCED LANDING OF "SAN FRANCISCO"
Florianopolis
Rio Grande do Sul
SOUTH ATLANTIC OCEAN
Mejillones
Tropic of Capricorn
Asunción
Paraguay
Parana
Corrientes
Coquimbo
Santa Fé
Valparaiso
Santiago
Buenos Aires
Montevideo
Talcahuano
Bahia Blanca
Mar del Plata
Valdivia
PACIFIC OCEAN
Route of Planes with approximate flying distances
Overnight Stops ■
Stops for Refueling only ▲
Forced Landings ✕
0 500 1000
STATUTE MILES
100 90 80 LONGITUDE 70 WEST OF 60 GREENWICH 50 40 30

Drawn by James M. Darley

THE ROUTE OF THE TRAIL-BLAZING FLIGHT OF U. S. ARMY AIRPLANES THROUGH 20 COUNTRIES OF LATIN AMERICA



Official Photograph, U. S. Army Air Corps

TESTING ONE OF THE AMPHIBIANS FOR THE 22,065-MILE FLIGHT

An odd feature of this plane is that its 400-horsepower Liberty engine is inverted. This was necessary so the propeller might have sufficient swing without cutting the forward end of the hull. The three steel blades of the propeller may be set at any angle, depending on performance required.

In each of our five planes there were two officers. In the flagship *New York* I had as my associate First Lieut. E. C. Whitehead; in the *San Antonio* were Capt. A. B. McDaniel and First Lieut. Charles McK. Robinson; in the *San Francisco* were Capt. Ira C. Eaker and First Lieut. M. S. Fairchild; in the *Detroit,* Capt. C. F. Woolsey and First Lieut. John W. Benton; in the *St. Louis,* First Lieut. B. S. Thompson and First Lieut. L. D. Weddington. Two of these were never to return (see text, page 485)

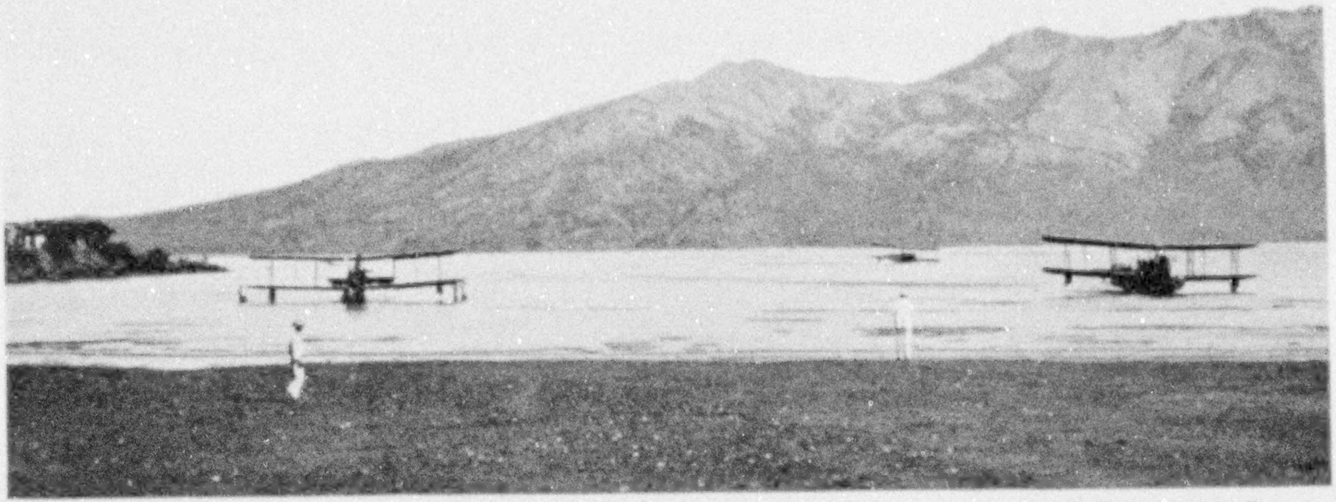
At the Mexican border, we well knew, our great adventure began in earnest. If we were to succeed and fly our gas-burning doves of peace over the often empty, waterless hills and along the strange, uninhabited shores of twenty foreign nations, only eternal vigilance and infinite caution must be ours. We faced a grim, rigid, and relentless routine.

With our Titan task before us, we took the air from Point Isabel on the afternoon of December 22, flew the Rio Grande, and straightened out down the Mexican east coast. For miles along the flat, sandy beach we saw no signs of human life, though the noise of our motors sent myriad wild fowl flying about us.

THE MAP OF MEXICO UNROLLS BENEATH US

In four hours Tampico's twinkling beacons broke through the hazy dusk. Turning on our own red and green starboard and port lights, we landed easily. But a Mexican Air Service pilot, who had flown from his capital city to Tampico to meet us, was not so fortunate. He had ascended with two passengers to entertain the large crowd waiting on the field for our arrival. After flying around a few minutes, he came down, guided by flares from two lighted buckets of gasoline. Failing to level his plane at the right moment, because of the insufficient illumination, he struck at a sharp angle, turned over, and was wrecked.

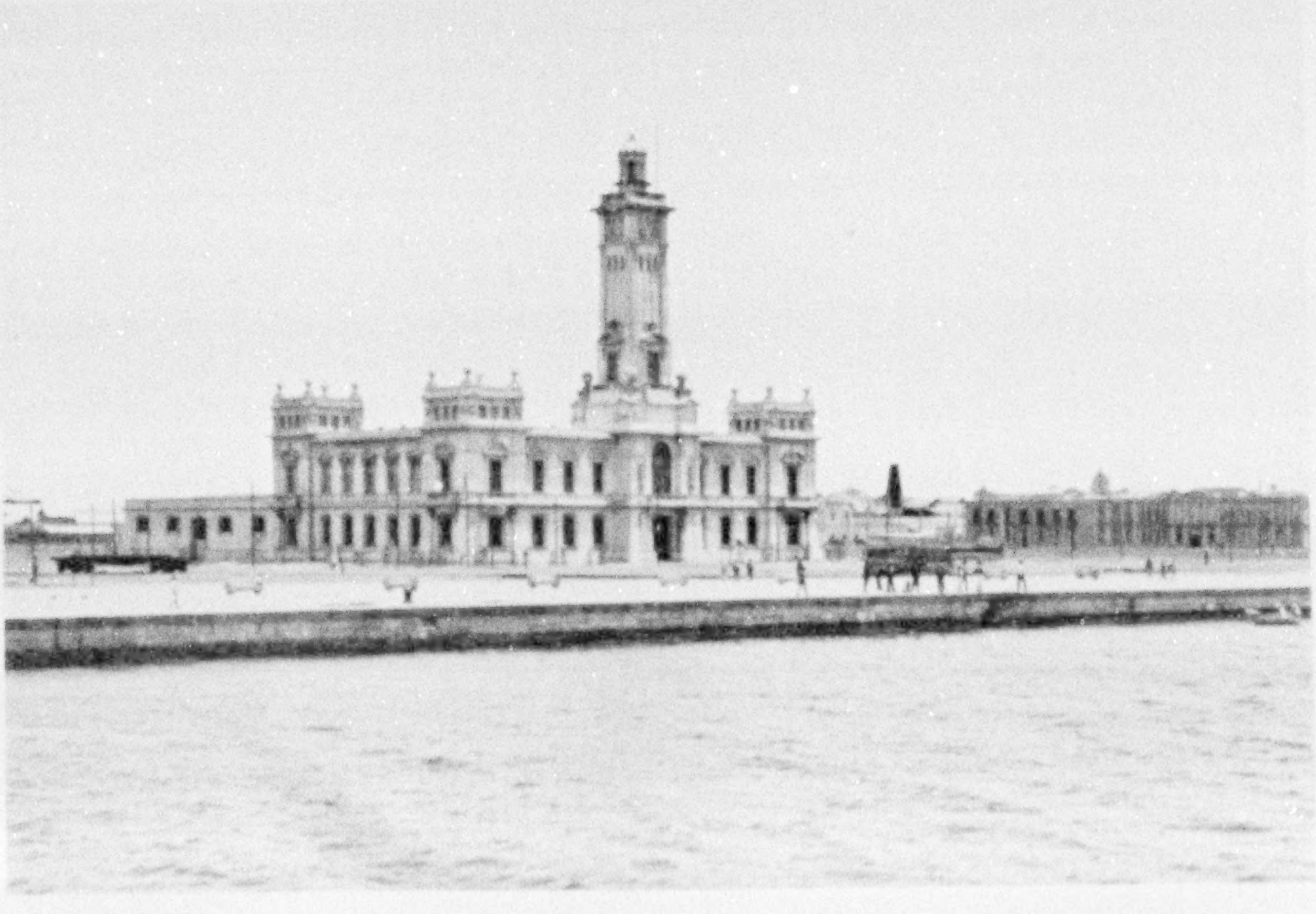
In this bustling, opulent oil town of Tampico we enjoyed the first of many welcome banquets hospitably given us by friendly cities along our path. Here hundreds of Americans make their homes. Fast trains tie Tampico to Texas cities,



Official Photograph, U. S. Army Air Corps

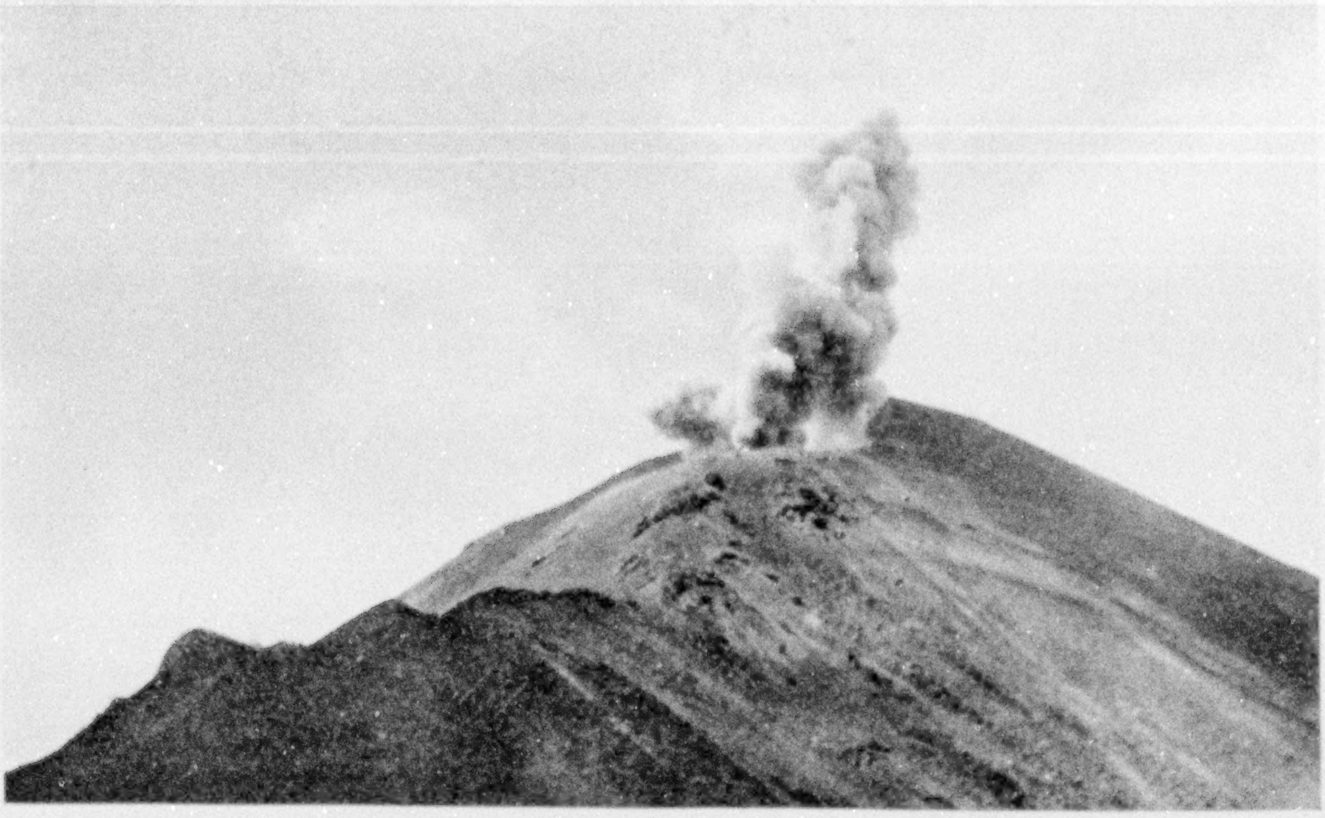
AMAPALA, THE ONLY PORT OF HONDURAS ON THE PACIFIC

When the American aviators arrived, a native brass band was waiting on the beach to serenade them. Here is a perfectly sheltered roadstead, through which passes much of the seaborne trade of Honduras, Nicaragua, and Salvador.



SINCE CORTEZ CAME, VERA CRUZ HAS BEEN A GATE TO MEXICO

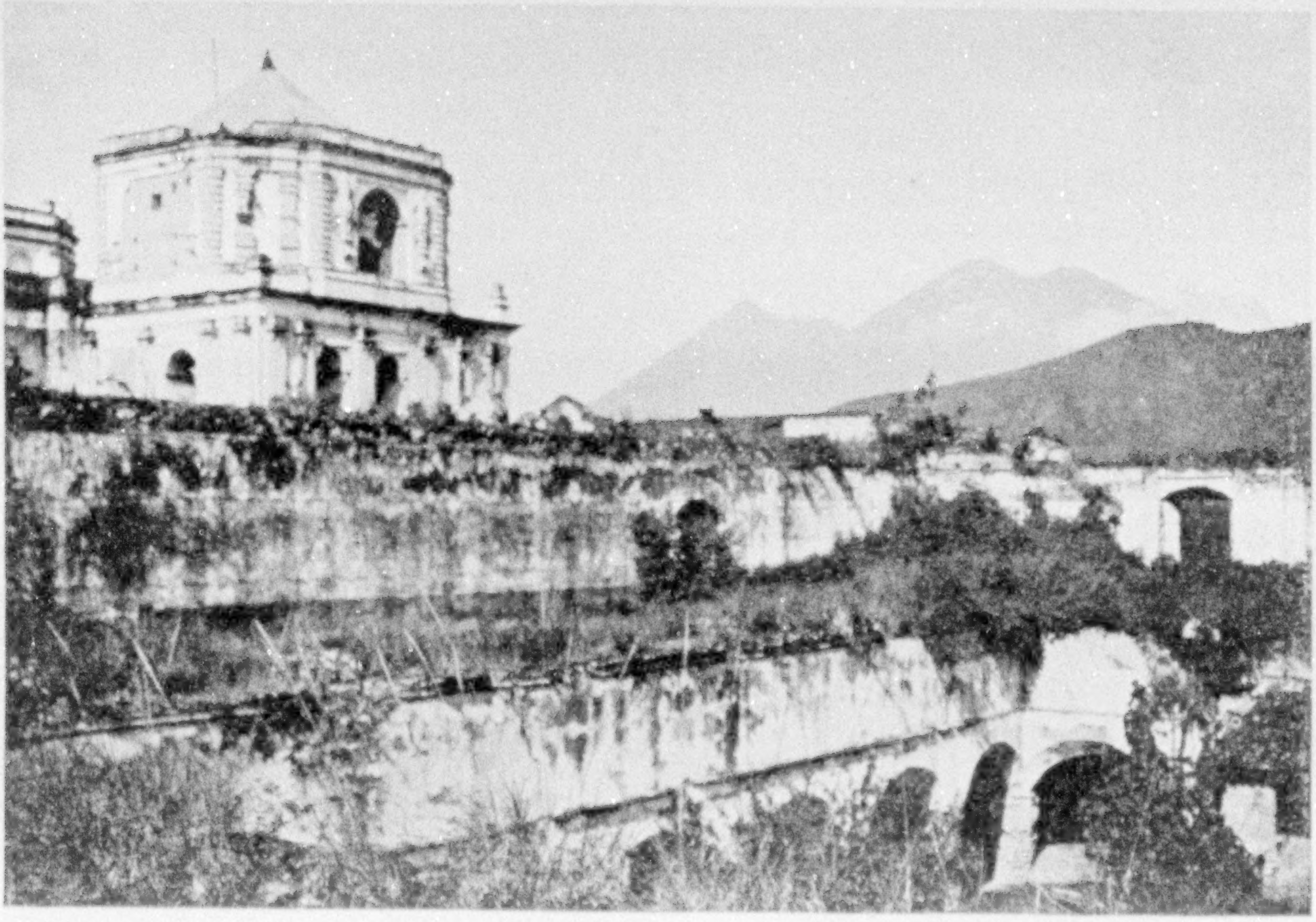
Through this east coast port, for centuries, have passed the friends and enemies of the Republic, as well as many of southern and central Mexico's imports and exports. Its customhouse handles much of the nation's foreign trade.



Photograph from Harriet Chalmers Adams

IZALCO, "THE LIGHTHOUSE OF SALVADOR," IN ERUPTION

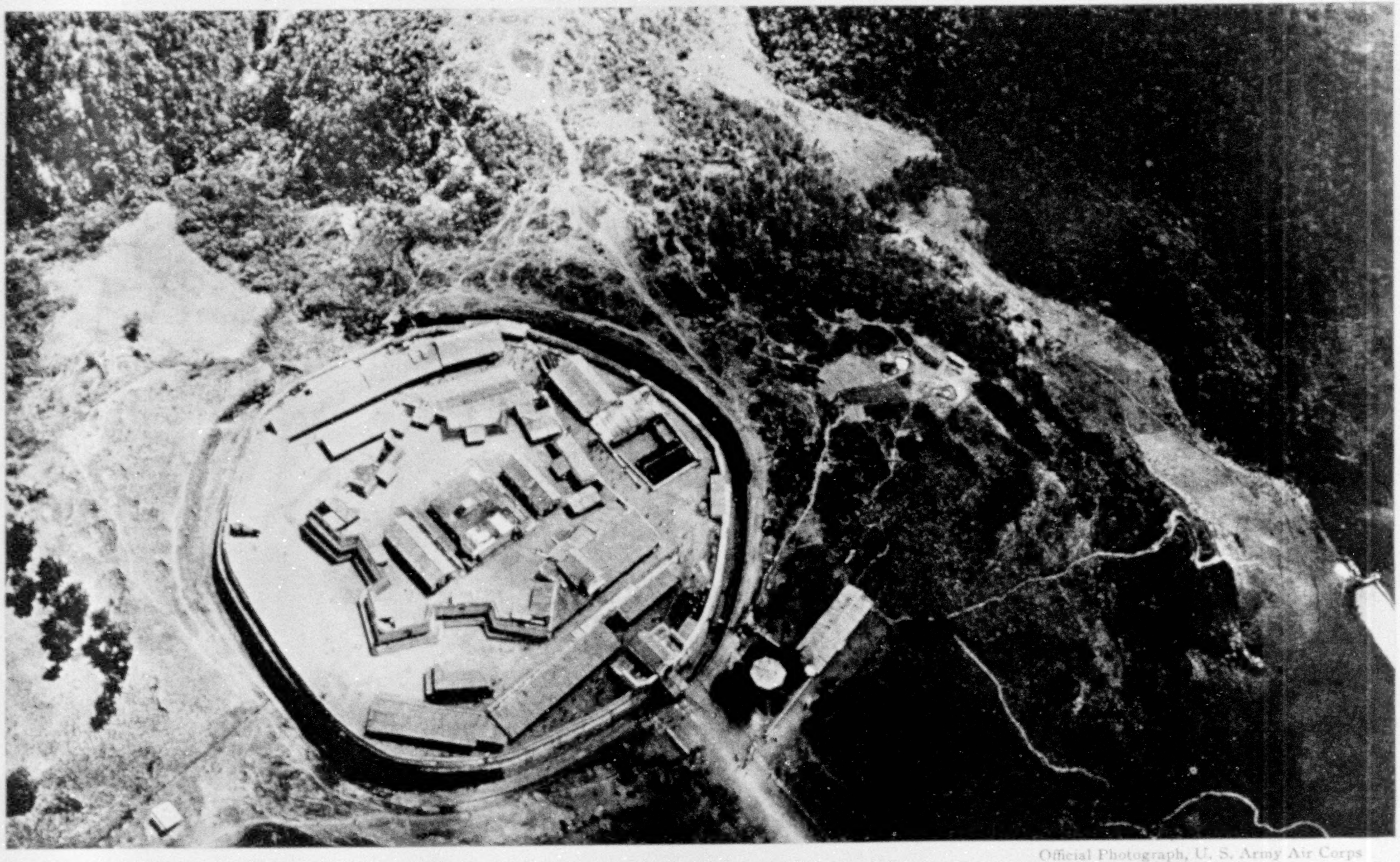
To west coast sailors this active volcano is a useful landmark. On a clear day its giant puff of smoke is seen far out at sea and by night it lights the sky above it. There are more volcanoes in this part of Central America than in any other area of similar size.



Photograph from Mrs. Philip Holland

EARTHQUAKES HAVE STREWN GUATEMALA WITH RUINS

Amid its mysterious temples and stone gods of a lost civilization, and its alligator pears and marimba music, Guatemala lives happily, despite its frequent earth tremblings. In the foreground are the ruins of the Convent of Mercy, destroyed in an earthquake.



Official Photograph, U. S. Army Air Corps

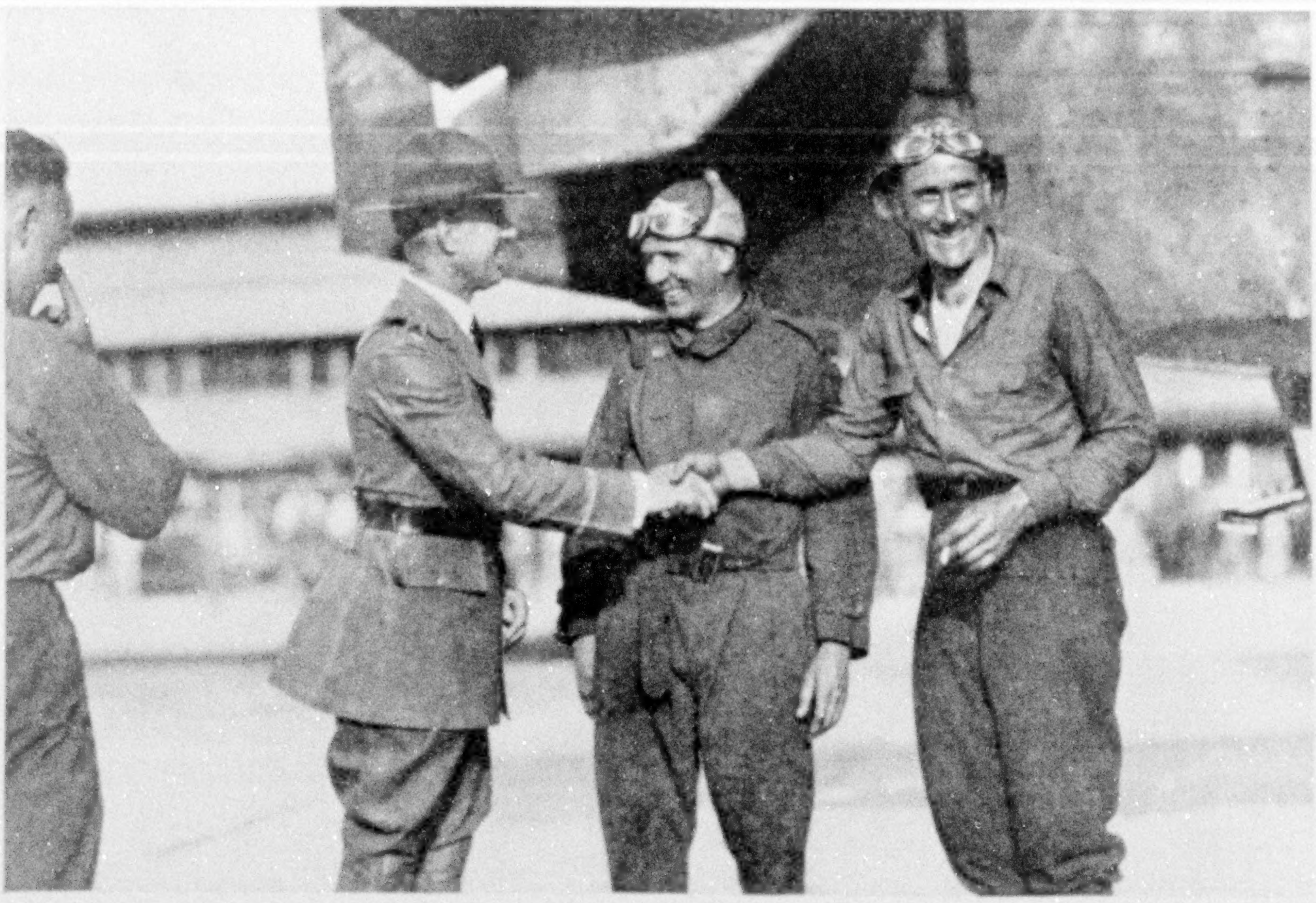
GUATEMALA CITY WAS OLD AND CULTURED WHEN BOSTON WAS YET A VILLAGE

The name Guatemala is an Indian word which means "A land covered with trees." To most Americans, however, the country is better known as the home of the alligator pear and the marimba. Throughout Central America, the University of Guatemala, its library and museum, have been famous for generations.

Official Photograph, U. S. Army Air Corps

PIRATES ONCE HAUNTED THIS NORTH COAST OF PANAMA

The path of the planes led past ruined Porto Bello, raided and looted by Morgan's buccaneers, who utilized captured nuns and priests as shields when they stormed the Spanish fort. In old days this was the Atlantic terminus of a highway across Panama, and here slave ships anchored to sell their human cargoes.



AVIATORS WOOLSEY AND WHITEHEAD ARRIVE AT FRANCE FIELD, CANAL ZONE

Official Photographs, U. S. Army Air Corps

THE "DETROIT" PROVED INTERESTING TO COLOMBIAN SMALL BOYS

Each plane carried emergency rations, parachutes, a "Very" pistol for signals, and one firearm for protection against wild animals in case of a forced landing in the jungle, and, crossing the Caribbean, a collapsible lifeboat. In the background, on the Magdalena River near Girardot, is a German mail and passenger plane (see, also, text, page 471).

Official Photograph, U. S. Army Air Corps

MECHANICAL "PTERODACTYLS" FLY OVER THE CARIBBEAN

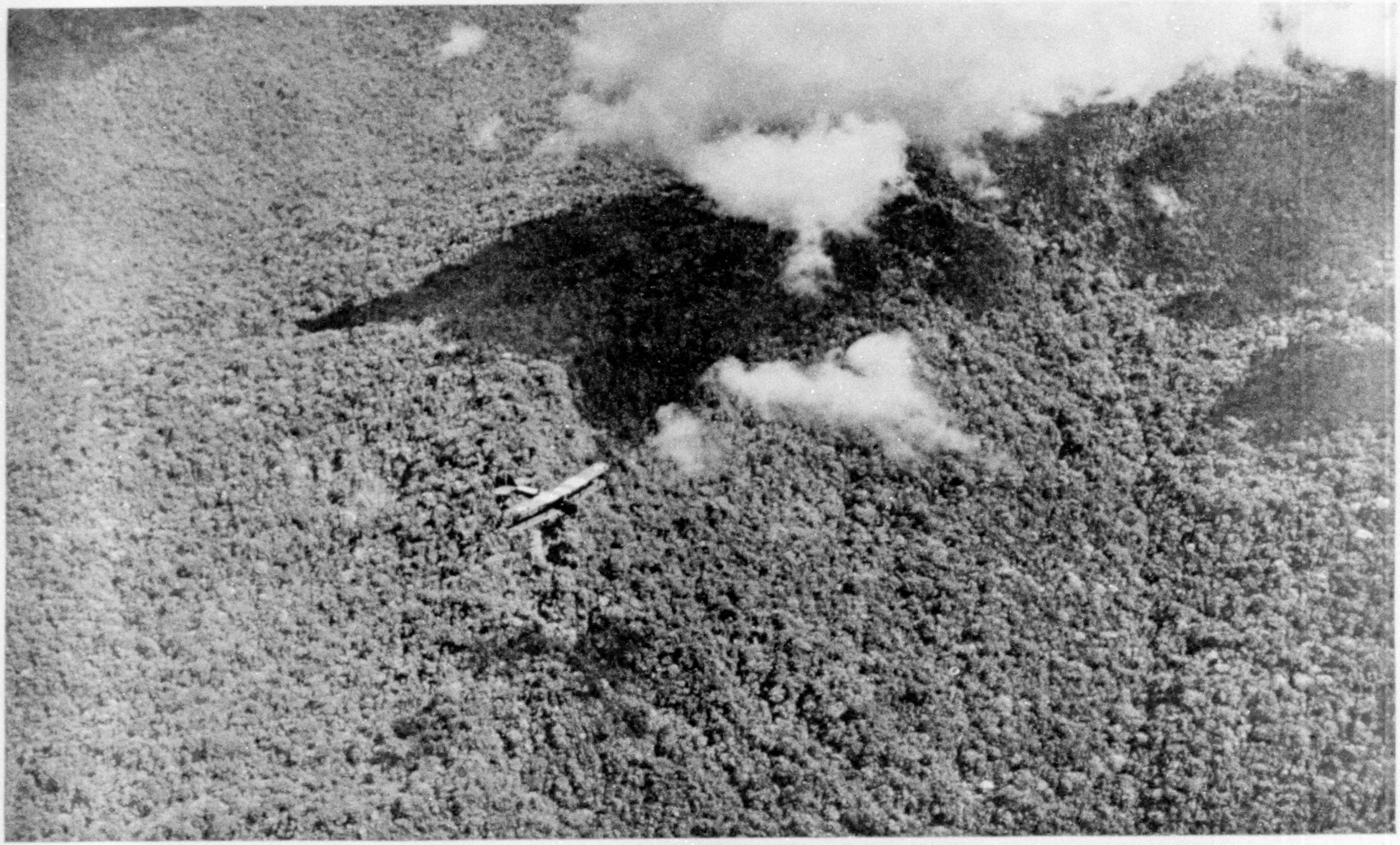
and from its oil industry Mexico has drawn millions in wealth.

From the air we waved *adiós* to Tampico and steered south for Vera Cruz. Down the coast a hundred miles a great "pillar of cloud by day," smoke from the Tuxpam refineries, marked the site of that odorous oil town. Though flying at 2,000 feet, we met the acrid crude oil stench.

Quaint, languid old Vera Cruz, with its battered walls and its famous prison fortress of San Juan de Ulúa, epitomizes the turbulent story of Mexico. It was here that Cortez first smote the astonished Indians and built his military base to conquer the Aztec Empire. As we circled overhead, we looked down on that historic roadstead where once the high-pooped galleons of Spain's famous "silver fleet" loaded the treasures of the conquered Indians for shipment back to Madrid. It is a crumbling, dying town now, for Tampico is taking its trade; but for 300 years Vera Cruz was the leading seaport of New Spain, the link between Europe and North America (page 454).

GALES TWIST OUR TAILS ACROSS TEHUANTEPEC

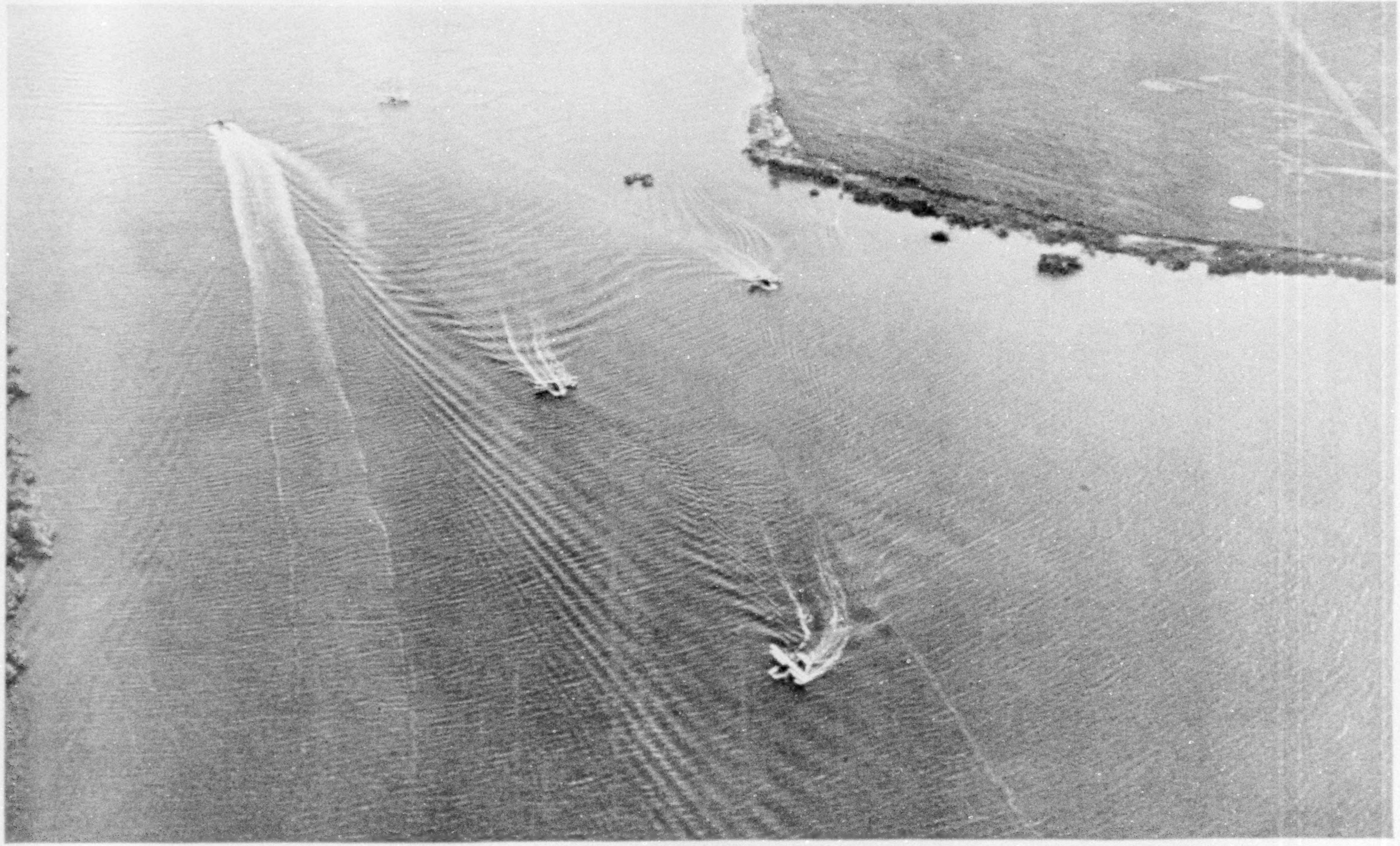
"Something always happens in Vera Cruz," the natives will tell you, as they point to the turbulent history of their town—sacked by pirates, plagued by disease, and wasted by many wars. We found it so. Barely had we hit the offal-strewn, buzzard-infested beach than a 75-mile-an-hour "norther" blew up. To save our shaking, wind-whipped planes from being wrecked or blown completely away, we had to bury railroad ties underground and anchor our planes to these with stout ropes. It was with thankful hearts that, on the last day of the old year 1926, we



Official Photograph, U. S. Army Air Corps

DENSE PANAMA FORESTS LOOK, FROM ABOVE, LIKE VAST FIELDS OF GREEN MOSS

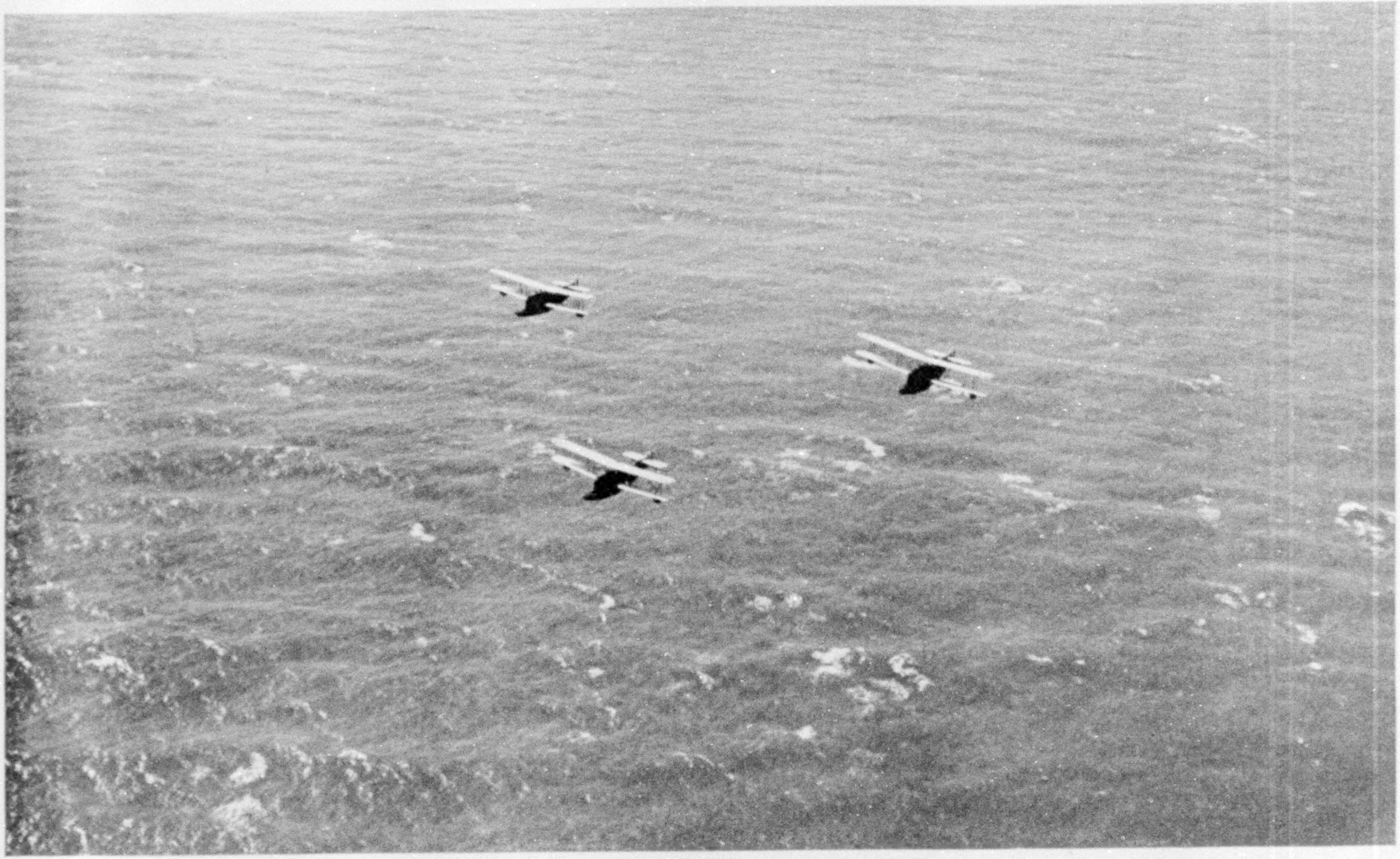
Only an air cruise can reveal the infinite areas of standing timber still available for man's use in Central and South America. Even when flying low, over regions known to be inhabited by wild animals, the aviators seldom saw signs of life, because of the thick jungle growth.



Official Photograph, U. S. Army Air Corps

LIKE BIG WATERBUGS, OR "SKIMMERS," THE AMPHIBIANS MANEUVER TO TAKE OFF

Throughout their long flight around the southern continent, in spite of gales and rough seas, the American flyers alighted on water wherever possible. A strange water landing is always preferable to alighting on unknown land. In this calm sea off France Field, Canal Zone, the flight leader is seen in the foreground, turning into the wind, with other planes coming into formation.



Official Photograph, U. S. Army Air Corps

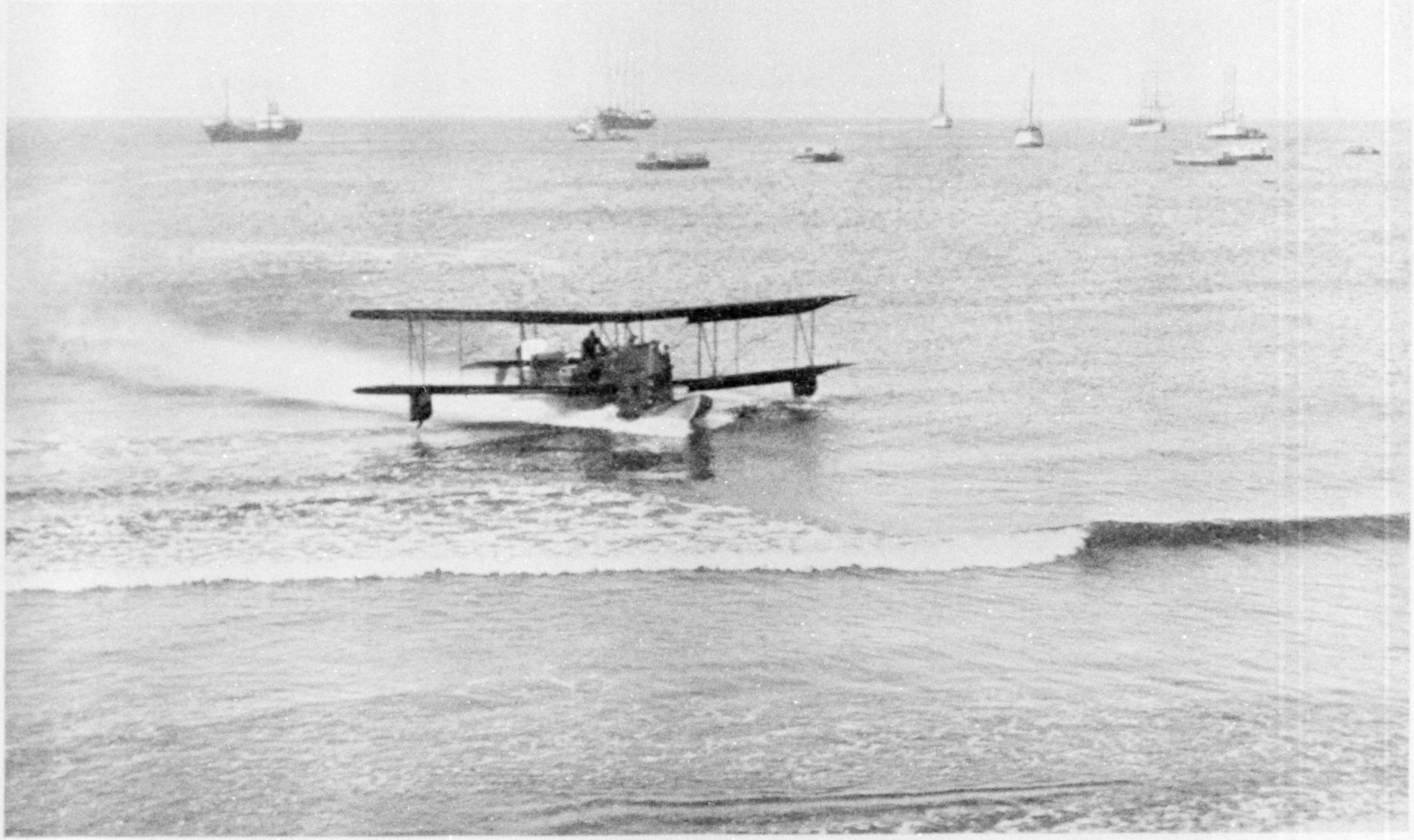
TUMBLING WHITE CAPS, SEEN FROM THE AIR, APPEAR LIKE CAKES OF FLOATING ICE

Stiff trade winds bounced and buffeted the planes over rough seas, as they flew along the north coast of Colombia. On his fourth voyage Columbus also passed this way and met with bad sailing conditions. Even over the Equator the aviators could keep cool by flying at 4,000 feet or higher.

Photograph by Wilson Popenoe

BOGOTÁ, COLOMBIA, LONG DIFFICULT OF ACCESS, NOW ENJOYS AIR TRANSPORT TO THE SEA

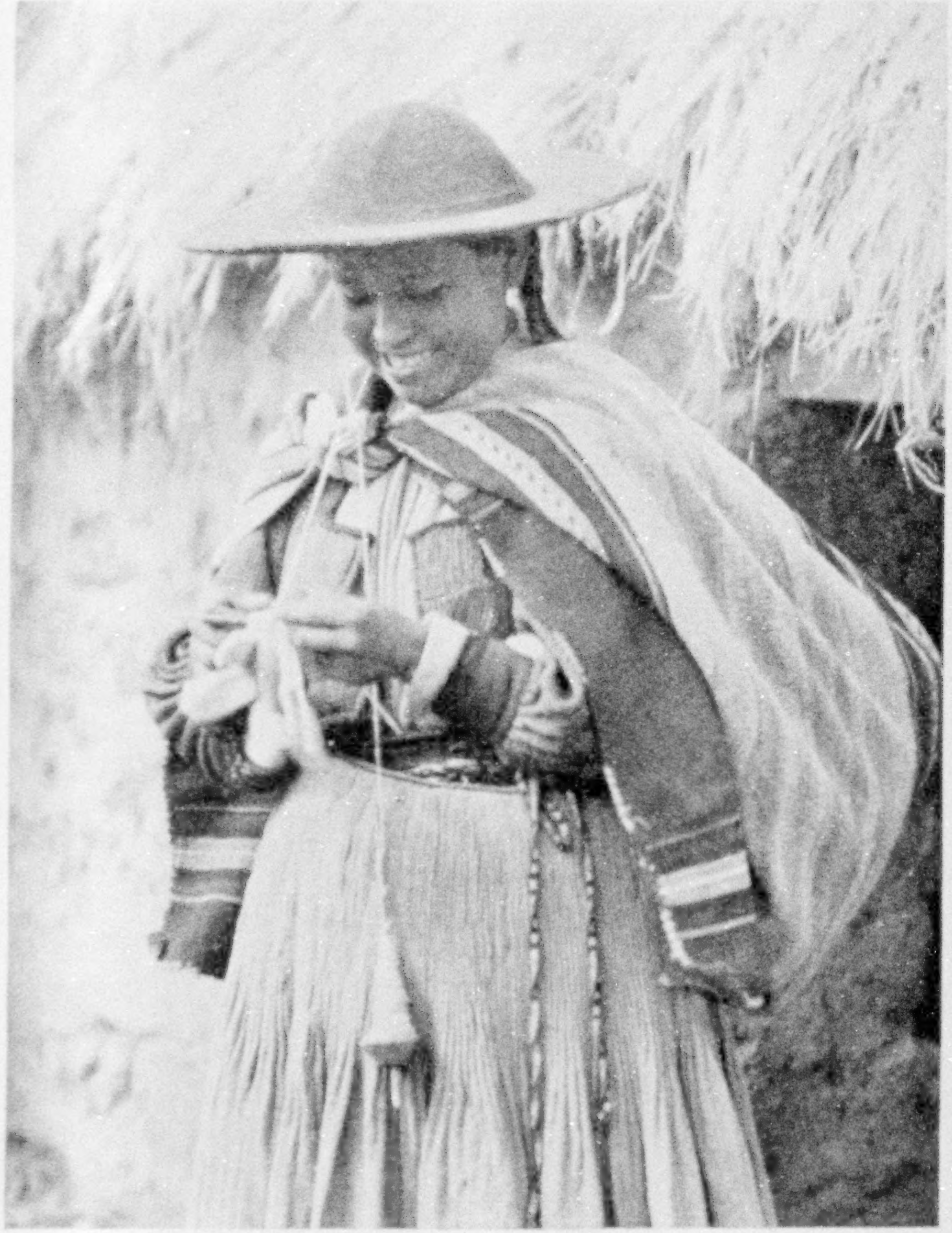
Sea-level winds were usually against the flyers on their cruise down the west coast of South America. To find a favorable wind they had to fly at elevations of 4,000 to 8,000 feet. In general they found that prevailing winds in cyclonic areas of South America blow in an opposite direction to those in North America.



Photograph by Kumakawa

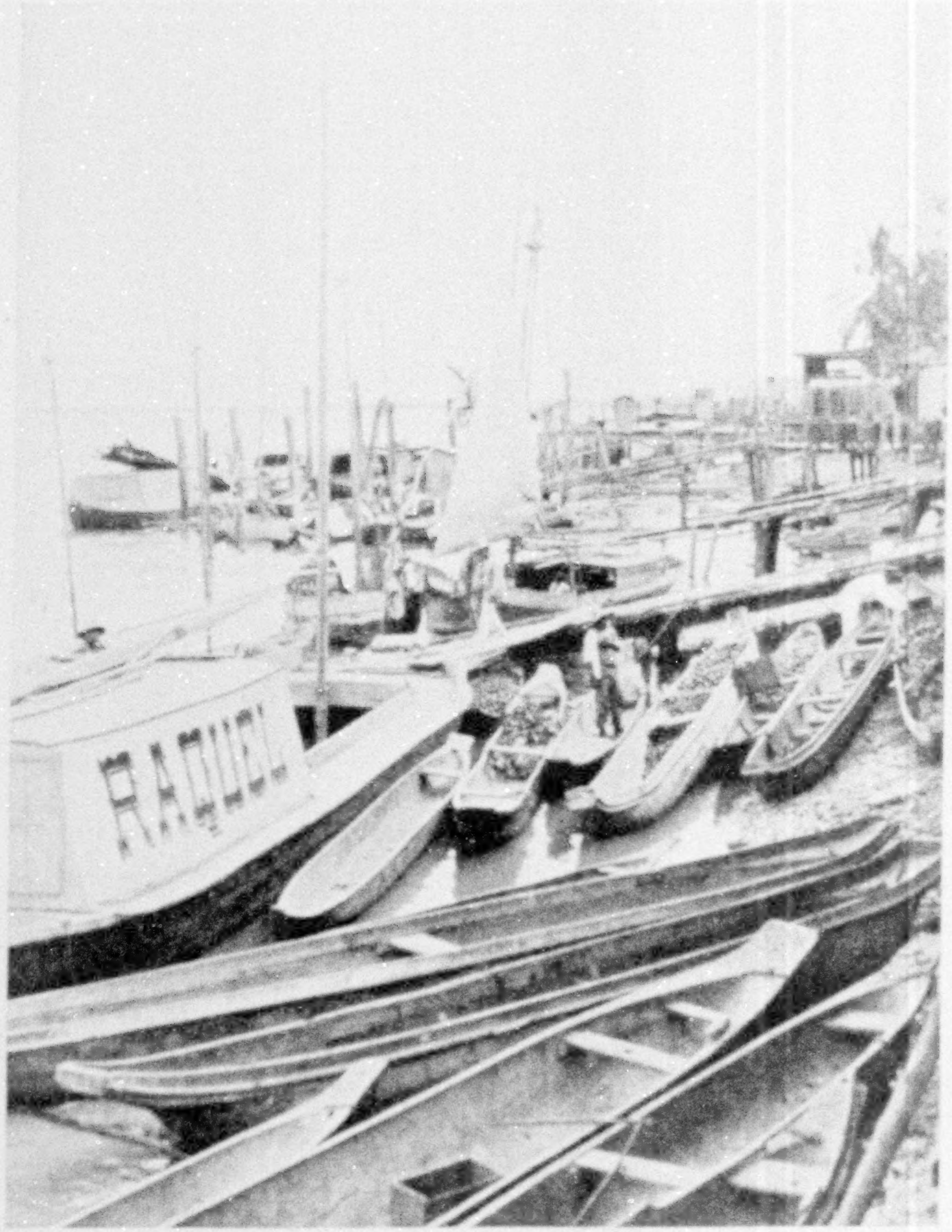
THE TURTLELIKE AMPHIBIAN SWIMS ASHORE AND CRAWLS OUT ON THE BEACH: PAITA, PERU

The amphibian alights on land or water. On the water, its wheels can be lowered to let it take the land. If on land, it can be run into water, where it floats easily on its hull. By a crank worked from the pilot's cockpit, its wheels can be lowered in five seconds.



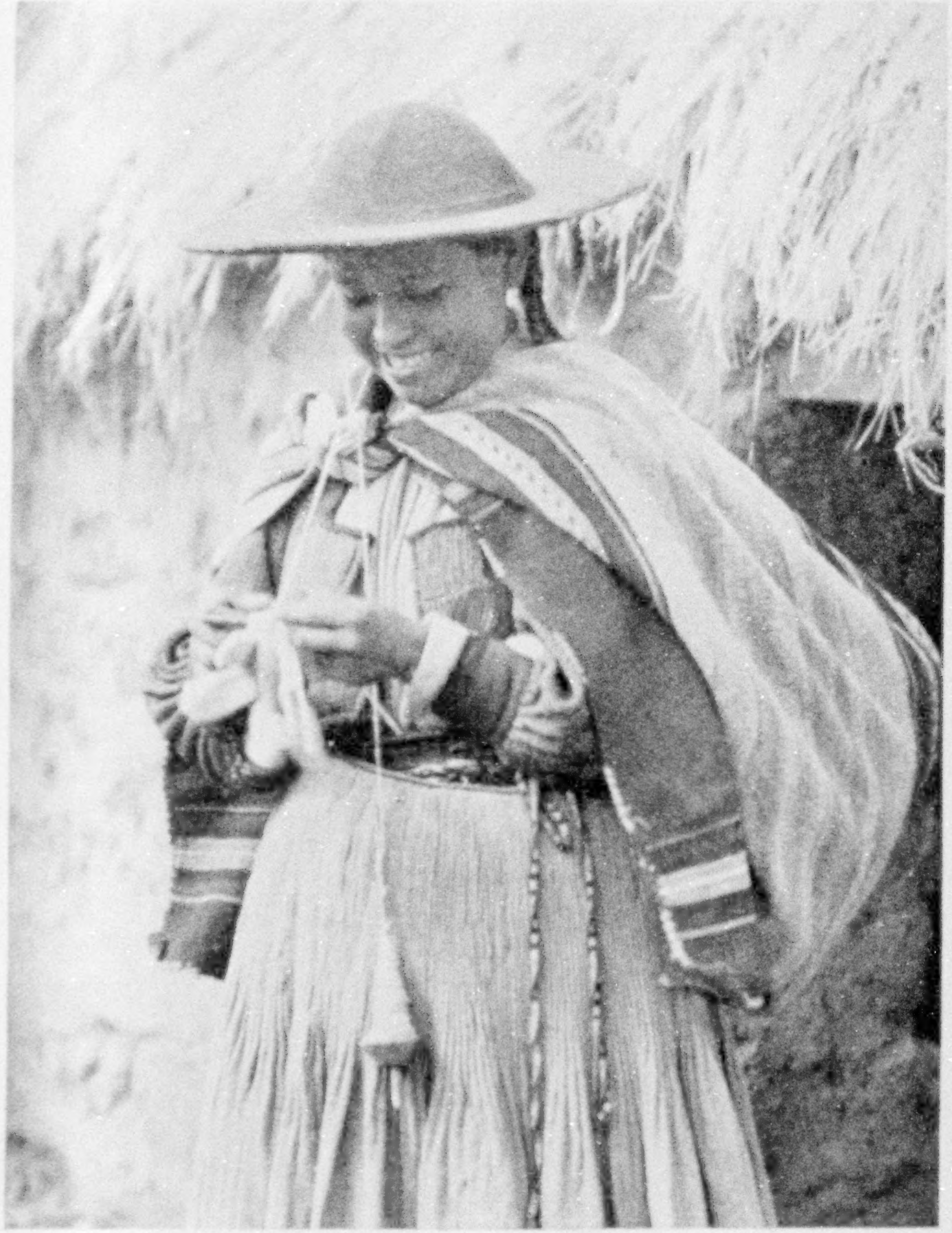
Photograph by M. Mancilla

"TENDING TO HER OWN KNITTING," IN AREQUIPA, PERU



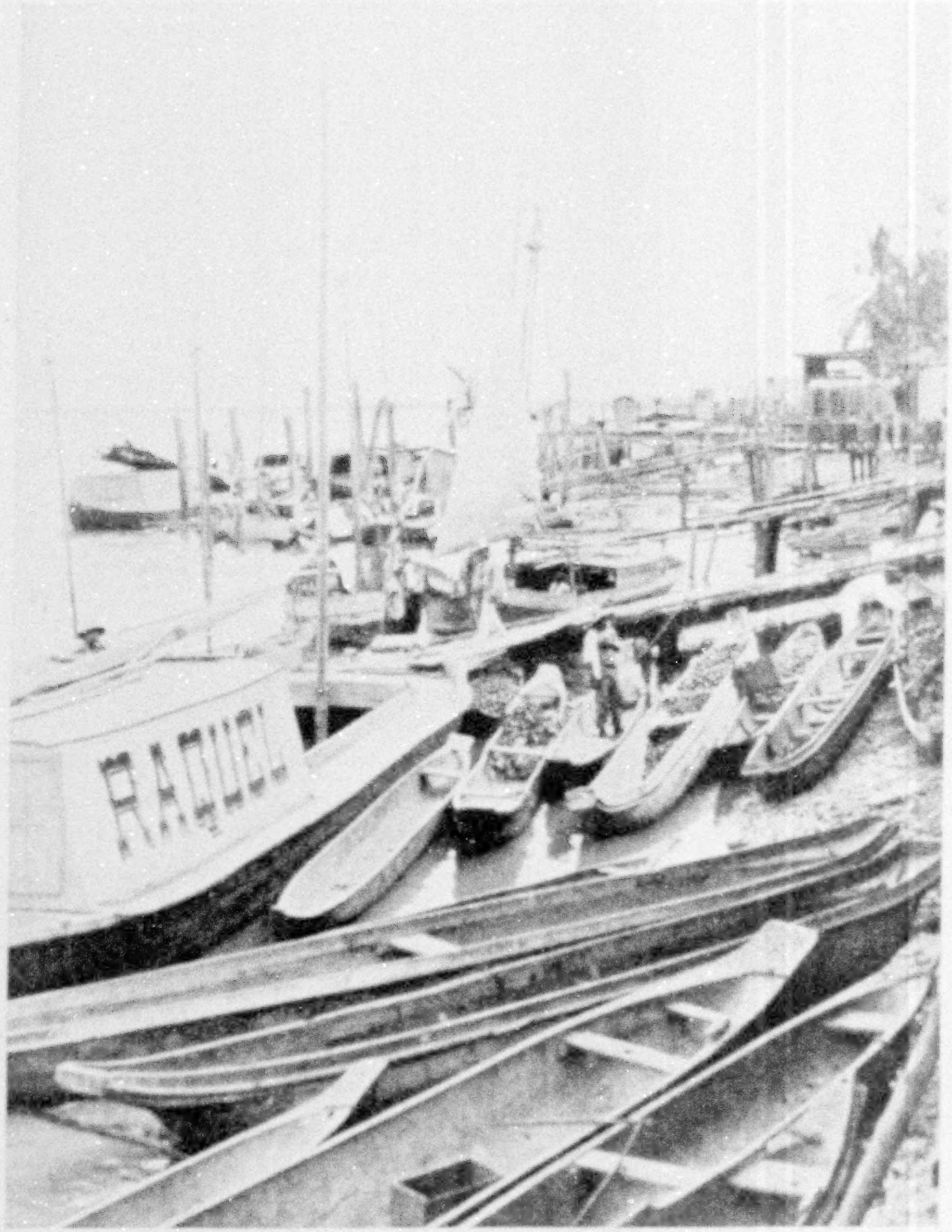
Photograph by Richard B. Hoit

DUGOUTS ON THE TIDE FLATS OF GUAYAQUIL, ECUADOR



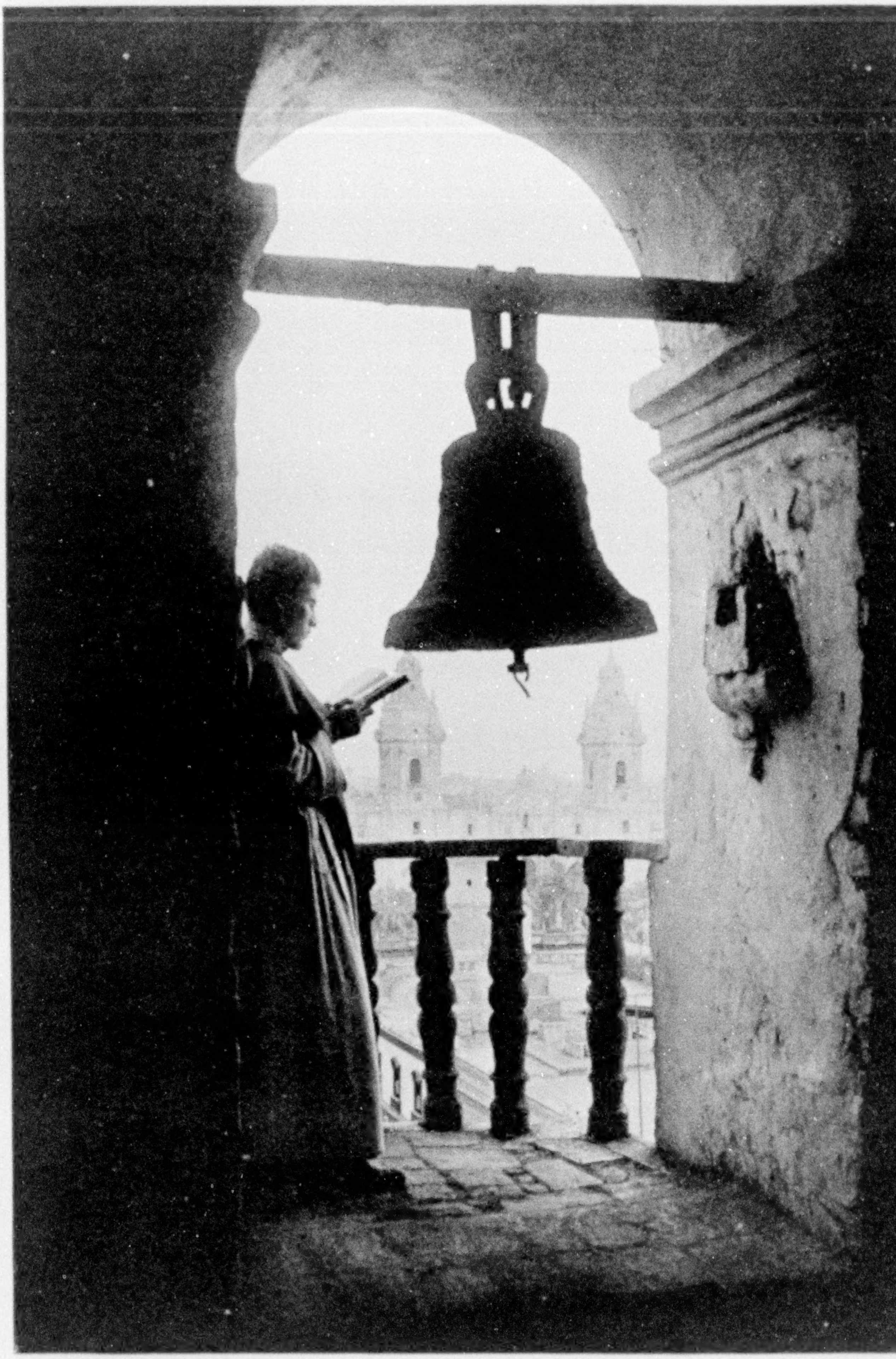
Photograph by M. Mancilla

"TENDING TO HER OWN KNITTING," IN AREQUIPA, PERU



Photograph by Richard B. Hoit

DUGOUTS ON THE TIDE FLATS OF GUAYAQUIL, ECUADOR



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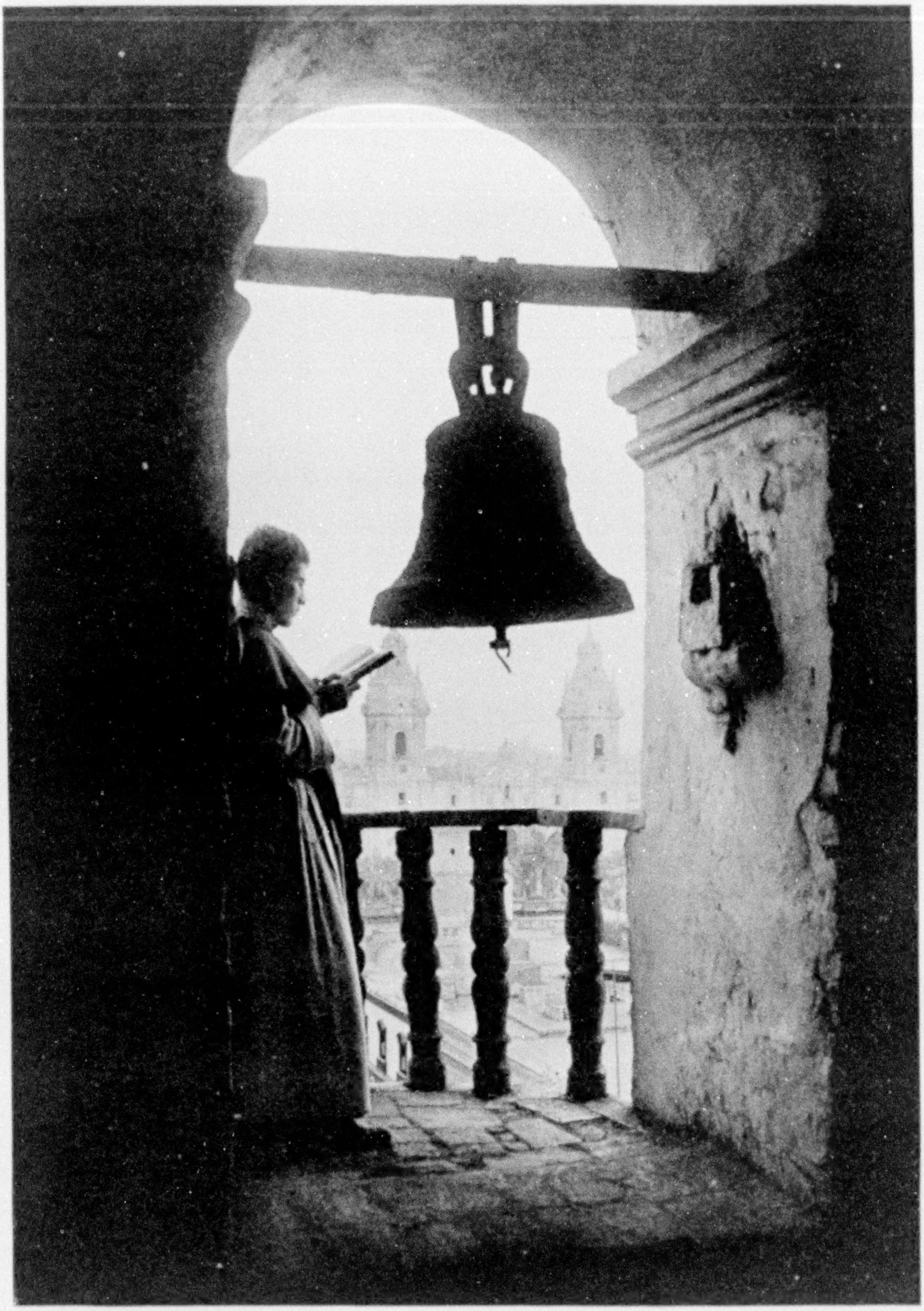
PIZARRO FOUNDED THE CITY OF LIMA

Under Spanish rule Lima, now the modernized capital of prosperous Peru, was the
city of South America. In this land of the Incas many convents and churches now stand w
once pagan temples lifted their walls of superb masonry.



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PIZARRO FOUNDED THE CITY OF LIMA

Under Spanish rule Lima, now the modernized capital of prosperous Peru, was the chief city of South America. In this land of the Incas many convents and churches now stand where once pagan temples lifted their walls of superb masonry.

Photograph by M. Maucilla

MISTÍ VOLCANO, PERU, AS SEEN FROM AREQUIPA

finally got into the air and sped southeast along the coast.

Minatitlán, on the Coatzacoalcos River, 20 miles from Puerto Mexico, where the British have developed an extensive oil enterprise, was our direct objective. Here we landed on the river and tied to an oil company's wharf. The New Year's holiday spent there with our English friends—a regular, rousing hands-across-the-sea sort of party—remains one of the happiest memories of our eventful voyage.

A bumpy New Year's Day ride in the skies carried us across the Isthmus of Tehuantepec from Minatitlán to Salina Cruz, on the Pacific coast. Borne by a howling gale, we made that 150-mile hop in 75 minutes flat, including the climb south of Mount Zempoaltepec, more than 11,000 feet high!

With the wind twisting our tails, we raced over swamps, jungles, and mountains. As we approached the heights, the velocity of the wind became terrific. As it swept around mountain peaks, we had to fight our controls every second. One moment an air wave would strike one wing and almost capsize the plane; the next moment another would strike the entire machine and it would skyrocket for several hundred feet; then a descending current would grab us and hurl us earthward.

With these angry wind gods we struggled all the way to Salina Cruz. Here, with rare luck, we managed to land behind a breakwater and get upon the wind-swept beach, where we made anchors for our tugging planes by burying railroad ties in the sand.

Salina Cruz itself, western terminus of the Transisthmian Railway, lies among bare brown hills that tumble down to sea. Long ago much of the land in this vicinity was granted to Cortez by the King of Spain, and it is said his descendants held it until within very recent years. I heard that the cross of Santiago, used as a cattle brand in the early days of Spanish rule, is still employed as a branding iron on the big *haciendas* of this Tehuantepec country.

For years American and European engineers talked of Salina Cruz as the possible western terminus of a ship railway across Tehuantepec. The Panama Canal, of course, marked the end of any such plan.

Now, to me, the busiest thing thereabout is the whirlwind. It seems to twist forever around those bare, empty hills. The sand it carries stung our faces like fine shot. Powdered sand got into our planes, our fountain pens, our watch cases.

With eyes and mouths full of Salina Cruz sand, we were glad to get into the air next morning. But we don't know yet how we did it, for a 50-mile offshore gale was blowing, and the only possible way to start was by taking off from the rough, open sea. Tossed like corks from wave to wave, we finally jumped off, one after another, and headed for Guatemala.

VOLCANOES GUIDE FLYERS IN GUATEMALA

Bucking a heavy offshore gale, we "crabbed" it slowly southeast over the long, almost straight, sandy Chiapas beach line, paralleled by jungles and lagoons.

Past the little ports of San Benito, Ocos, and Champérico we flew, and soon were circling over San José, chief seaport of Guatemala and Pacific terminus of the American-built railway which ties Guatemala City to the Pacific. Turning inland at San José and flying now almost northeast for the capital, we crossed over a section of what will some day be part of the long-talked-of Pan American Railway—a line to link up the Americas as the Cape-to-Cairo line plans to link Egypt with South Africa.

Guided by a giant smoke plume, puffed up from Fuego, hard by extinct Agua and Pacaya, triplet peaks of these earthquaky hills, we soon flew the 75 miles from the sea to Guatemala City and landed there at 5,000 feet.

To the President of Guatemala, who received us at the landing field, we presented an official letter of greeting from the President of the United States. This city, one of the most charming of Central American capitals, extended us the warmest hospitality.*

But Guatemala came near marking the end of the flight for Whitehead and me. As the fleet, heavily loaded with gas, took off in a wind, it was difficult at this elevation to clear certain obstacles bordering the flying field. "Trees in front of my rising plane seemed to grow at the rate of 50 feet a second," one of our flyers afterward said. My own plane, the *New York*, developed a miss in the motor just after getting into the air. To avoid smashing into an old stone aqueduct, we shut off the gas and squatted in a cornfield, breaking our landing gear and damaging our hull. Seeing us in trouble, the other planes came back.

After repairs, the *New York*, with the aid of the Guatemalan Government and kindly railroad officials, was hauled to near-by Lake Amatitlán, where once again we saw the advantage of flying an amphibian. Though too heavy, when fully loaded, to clear safely the obstacles about the small flying field, the flagship rose readily from the lake.

Amatitlán is as blue and beautiful as the lakes of Switzerland. Boiling springs near its shores hint at Nature's terrestrial unrest in that region. To these hot springs local washerwomen bring their laundry work. It saves fuel.

Safe and sound here at home, we Americans think little of volcanoes; but in our flight down Central America we saw plenty of evidence that the volcano business is still active. On the way to San Salvador we passed one mountain whose whole huge side had been completely blown away—a disaster which a few years ago destroyed fields, forests, and villages. And there was Izalco, so exact in its explosions that it might well serve as a master timepiece in this part of the world. Every 20 minutes it belches forth a great column of smoke and steam, serving as a beacon for ships as far out as 60 miles at sea (see page 455).

INTO A LAND OF STONE IDOLS AND BANANAS

From Lake Ilopango, on which we rested during our pleasant visit at San Salvador, we hopped off for Amapala, Honduras, on the Gulf of Fonseca. Here a native army band played lively music for us, as we hauled our planes out on the beach of this tiny but happy land of bananas, stone idols, and giant mahogany trees (see illustration, page 454).

As the landing field at Tegucigalpa, the Honduran capital, is too small to accommodate heavy amphibians, we left our ships at Amapala and motored inland, over hairpin turns and around dizzy slopes. In honor to the friendly nation we represented, the Honduran Congress adjourned during our visit.

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*See, also, "Guatemala: Land of Volcanoes and Progress," in the NATIONAL GEOGRAPHIC MAGAZINE for November, 1926.

Loath as we were to leave this pretty, peaceful, and railroadless mountain capital, rigid adherence to schedule called us quickly back to our waiting planes, and from Amapala we took the air for Nicaragua, flying over the extinct volcano of Coseguina. Twice I circled its fire-baked, rough old rim and saw my plane's shadow sweep over the lake of robin's-egg blue that lies in its crater.

Far ahead of us, rising from the crater of Momotombo, a thin column of smoke, acting as a weather vane, showed us the wind's direction, as we flew for Lake Managua. Here we landed, opposite the capital city of Nicaragua. Quickly anchored, we called on the president of this restless republic, exchanged official greetings, and were off.

Flying southeast, we soon were crossing that large inland body of water called Lake Nicaragua. Our destination was the Gulf of Nicoya, whose stormswept shores are lined with shipwrecks. We realized that we were facing difficulties, as we approached these notoriously turbulent waters. And Nicoya did not belie its reputation. Until we finally succeeded in making a landing at Puntarenas, on this stormy gulf, we had not had time to see the big blisters worn on our hands through hard gripping of the controls.

"POKING OUR NOSES" TOWARD EQUATOR

Cacao, coconuts, and coffee piled up at Costa Rica's busy port of Puntarenas, known to deep-water sailors for its hard-blowing *chubascos*, reminded us we were well into tropic lands.* A short trip up to San José, the capital city, more official calls, and again we poked our buzzing noses toward the Equator.

Painted against the high green hills of Costa Rica, flocks of rainbows, formed by sun rays against mountain showers, followed us on our flight. In a dead calm we struck the low, green-timbered hills of Panama, habitat of the timid tapir and the sleepy sloth. As we floated peacefully toward the Canal, I wrote letters home as comfortably as in the writing room of an ocean liner.

Then 27 U. S. Army planes, from France Field, on the Zone, came out to meet us. Waving a greeting from the air, they pulled into formation and escorted us to the landing.

WE STOP FOR MAIL IN PANAMA

Five motor trucks full of letters awaited us here. Our first duty, of course, was to overhaul our planes for the long, hard grind ahead. Now and then, however, we would lay down our monkey wrenches and answer letters.

It was Sunday, January 22, when I lined up our fleet for the hop-off to Bogotá, in the high heart of Colombia. But the water was rough and the planes were heavy with gas for the first long leg across Darien Gulf to Barranquilla. Two ships, their hulls damaged, were left behind.

The *St. Louis, Detroit,* and *San Francisco,* safe in air, headed for the 400-mile cruise through trade winds along the north coast of Panama and Colombia.

Flying low over tiny, flat, coco-covered isles, where San Blas Indian huts rise thick as row houses in a realtor's dream, we got a good idea of how these people live. It was amazing how many Indians could crowd on one small isle—almost as cormorants or pelicans cover a rock off some favorite fishing beach.

Whizzing barely 50 feet over their palm-leaf homes, I fear the sudden roar of our planes scared many San Blas babies so badly they may never grow up. Even full-grown Indian men, we noted, leaped from beach to boat or scrambled up among the coconuts, as our planes went thundering by.

Towing a big sea turtle that he had harpooned, one San Blas buck paddled just under us. Tortoise-shell "plates" taken from the 5,000 or 10,000 big turtles killed by these Indians every year are sold to London, we were told, at fancy prices.

On the Zone they told us of one explorer who returned greatly excited from these islands, saying he had found a tribe there which belonged to a well-known American uniformed secret society. To

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* See, also, "Costa Rica, Land of the Banana," by Paul B. Popenoe, in the NATIONAL GEOGRAPHIC MAGAZINE for February, 1922.

Official Photograph, U. S. Army Air Corps

PERUVIAN ARMY PLANES FLEW OUT TO WELCOME THE AMERICANS

Leaving Paita, the American flyers turned the "shoulder," or westernmost point, of South America. On their way to Lima they suddenly passed from the equatorial rain belt into a dry, empty coastal country where no rain may fall for years.

EASIER TO LOOK AT THAN TO LISTEN TO

Bolivian Indians blowing their own horns at a fiesta in La Paz. The frequent holidays in Latin America, in honor of saints and patriots, independence days and battle anniversaries, provide the peon's only diversion.

prove it, he showed photographs of San Blas bucks wearing the fancy headgear of this "order." The explanation was that during canal-construction days such a "lodge" had been formed by Americans on the Zone, but it had dissolved before its uniforms arrived, and years later the importer had traded part of this regalia to the Indians for turtle shell and beeswax!

Land faded from view as we cut across the Gulf of Darien, an arm of the Caribbean. Below, a rough sea tossed and tumbled. Wherefore I worried when the *St. Louis* signaled "engine trouble" and began to lag. It limped along, however, until we neared the Colombian coast. Then it sank to the sea. I gave it up for lost. I did not see how any plane could alight on such tumbling seas and not be pounded to pieces.

Gloomily and reluctantly, therefore, we had to fly on, leaving Thompson and Weddington to save the *St. Louis* and themselves if they could.

Hours later, when we had alighted at the Magdalena's mouth and were housing our planes in the sheds of the German "Schadta" Company, which operates an air fleet in Colombia, imagine our relief and delight to see the good old *St. Louis* come roaring in!

"No boats were in sight. Soon the billows would have broken us up," explained Thompson. "We couldn't get her ashore, so we decided we'd just as well break her up trying to fly as to hang on until she went to pieces under us. So we just gave her the gun and bounced from wave to wave till a big one threw us about fifty feet into the air. That was our chance! We nosed her over the next incoming roller, and here we are."

BATTERED "ST. LOUIS" SHOWS EFFECTS OF FIGHT WITH WAVES

The battered old *St. Louis* plainly showed a beating. Its radiator was bent and leaky and the steel propeller was twisted like a scimitar.

When paddle-wheel steamers up the Magdalena are lucky enough to miss snags and sand bars, passengers from Barranquilla south to Bogotá, more than 600 miles inland, may make the trip in two weeks, more or less. We flew it in seven hours, with two stops—that is, we flew to Girardot, as near Bogotá as we could get and still land in the river, here a swirling current between canyon walls (page 458).

Because of cool, clean water running along its street drains, Bogotá reminded us of Salt Lake City. Isolated and clinging atop an 8,560-foot plateau, Bogotá will probably never become a great trade or industrial center, but we found it a seat of learning and culture, leisurely acquired since Quesada founded it, in 1538.*

AIRPLANES NOW GIVE BOGOTÁ QUICK SERVICE TO THE OUTSIDE WORLD

Bogotá, more, perhaps, than any city anywhere, is grateful to the inventors of airplanes. Now, by the well-run German Schadta planes, it gets mail quickly and often, and its travel time to the outside world is cut by weeks.

From a business standpoint, also, this Magdalena air line is the most successful air commerce enterprise now operating in Latin America. Its receipts are comparatively enormous. It operates without any subsidy. It issues its own air-mail stamps and, besides mail and passengers, it carries quantities of express. Planes are booked up for weeks to come. Receipts from mail alone on one day were more than $700.

The secret of its success, I believe, should be considered in studying air-commerce problems elsewhere. It is this: the route is long and the only other means of traffic is difficult.

Returning downstream, we stopped at the Magdalena River American oil colony of Barranca Bermeja for fuel. Here our Yankee friends had specially distilled for us some good, lively gas, which we much appreciated.

In a local disturbance the day before about 50 people had been killed. As we took the air, many of the trouble-makers, in shackles, were being loaded on a river boat for deportation.

Tropic dusk darkened the old walled port of Cartagena when we glided over Boca Chica and alighted where, long ago, Sir Francis Drake and other sea hawks dropped their mudhooks. About us a

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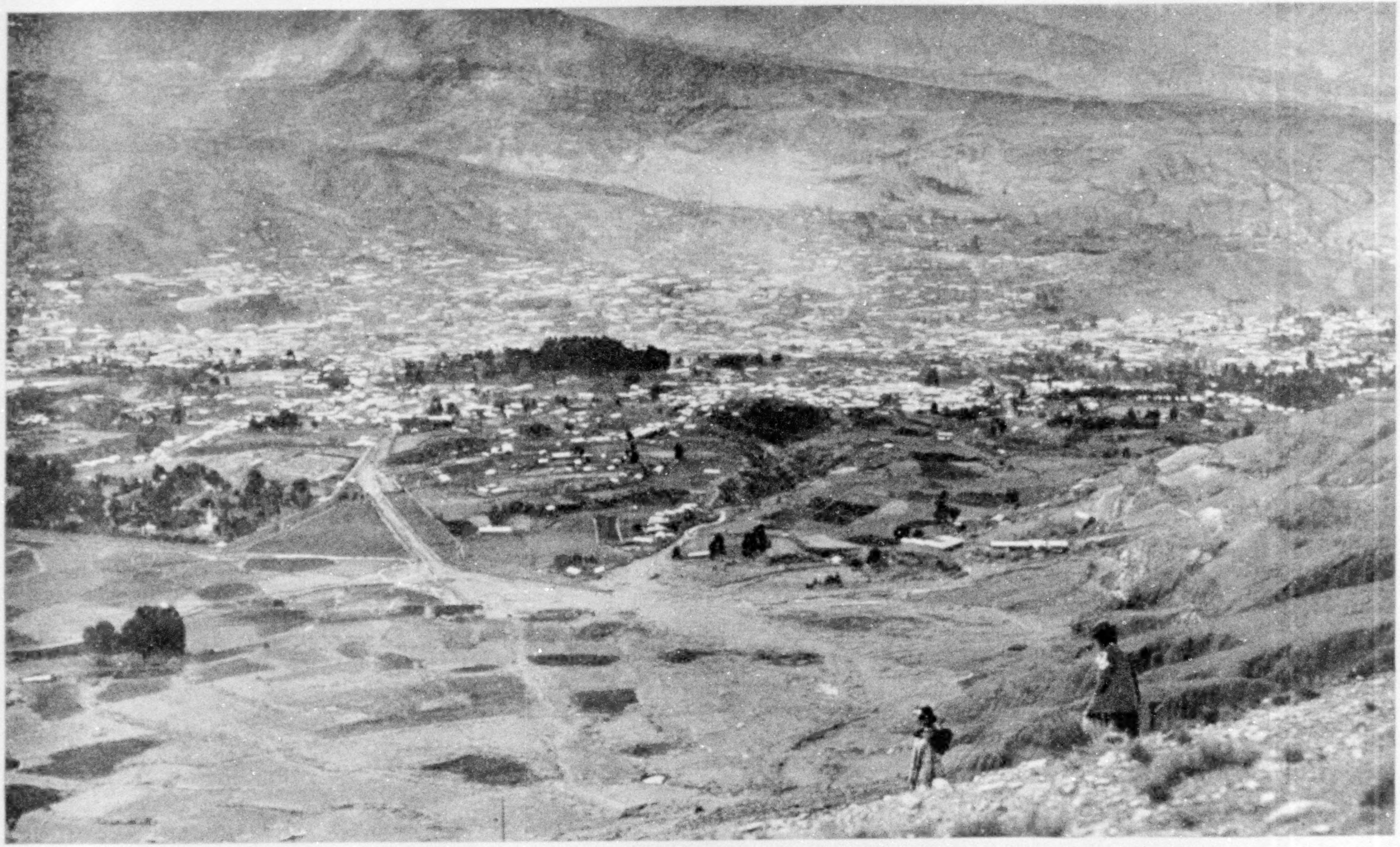
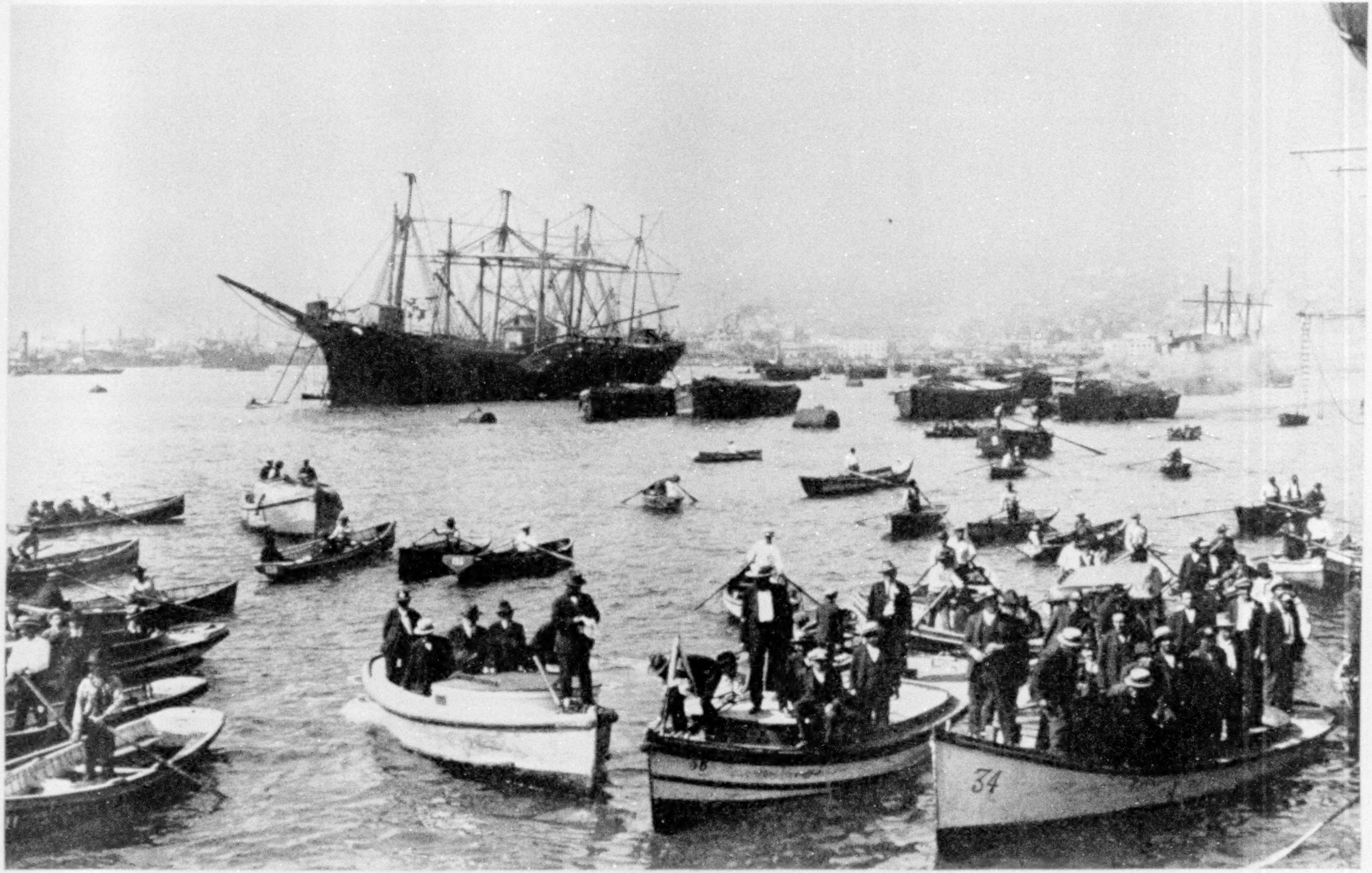
* See, also, in the NATIONAL GEOGRAPHIC MAGAZINE, "Over the Andes to Bogotá" by Frank M. Chapman, October, 1921, and "Round About Bogotá," by Wilson Popenoe, February, 1926.



Photograph by A. A. Hauff

LA PAZ, CAPITAL OF BOLIVIA, STANDS 12,700 FEET ABOVE THE SEA

Crossing the high Bolivian plateau, one comes suddenly on a giant vent, or canyon, 10 miles long and 3 miles wide. Hidden in this depression, on a site occupied by prehistoric people, lies La Paz, the City of Peace.



Photograph by Alice Schalek

VALPARAISO, WITH ITS HUGE SEA TRADE, MIGHT BE CALLED THE SAN FRANCISCO OF SOUTH AMERICA

Through the Canal, around the Horn, across the Pacific, ships of seven seas meet at Chile's west coast port, from which a railway crosses the Andes to Buenos Aires. In its 400 years, Valparaiso has suffered much. From the days of Drake and Hawkins, pirates looted it and rebels wrecked it. Three times in the past century earthquakes laid it low. Yet to-day it is the greatest Pacific trading port south of California.

THE LATIN AMERICANS ARE A PIOUS PEOPLE

High above the summit tunnel of the Transandine Railway stands this "Christ of the Andes." A legend on it reads: "Sooner shall these mountains crumble into dust than the people of Argentina and Chile break the peace which they have sworn to maintain at the feet of Christ, the Redeemer."

motley fleet of trading craft, bringing in hardware, cutlery, machinery, and dry goods and loading hides, coffee, sugar, and other exports, rode at their anchors. Black stevedores and black denizens of the beach swarmed everywhere. It is a noisy, redolent, yet busy port. For nearly 400 years it has been a shrewd trader in the commerce of the Caribbean. As early as 1697, they told us, French raiders plundered it, exacting a ransom of more than $5,000,000.

Something tasting like turkey, but shaped like a rabbit, was on our plates that night.

"It's a *guartanaja*," one of our hosts told us. "It's built like a suckling pig, but has a prettier face and fur like a kitten."

They gave us a guartanaja as a mascot when we left Cartagena. It seemed to enjoy flying. We fed it part of the cake which the consul's wife had put in our lunch kit. But, once an aviator has tasted Colombian guartanaja, he is never the same. At France Field (see, also, illustration, page 461), next day, we sacrificed our baby-faced mascot and ate him with carnivorous gusto.

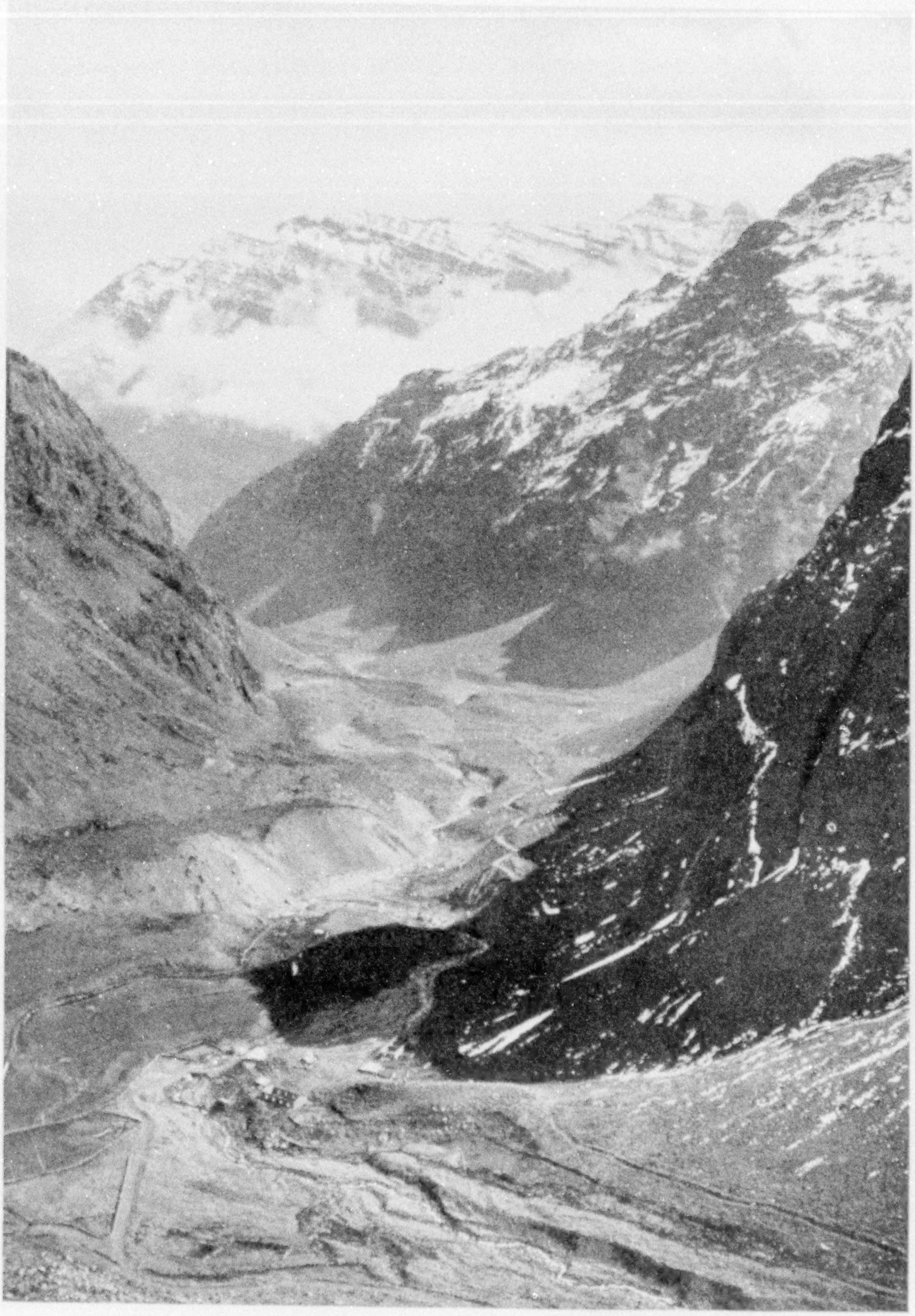
Spick and span again, fully repaired in the shops at France Field, the *New York* and *San Antonio* rejoined us now for our long flight down the west coast of South America.

Along the Canal we flew, where 6,000 ships a year now make this waterway as busy as Suez. Over the old jungle-lined ditch begun by de Lesseps, over the graveyards where thousands lay who died of fever before science conquered the mosquito; over Uncle Sam's big guns that guard the Pacific entrance of the Canal; over "Old Panama," once the rendezvous of Harry Morgan's raiders, then straight away southeast across the broad, silent, velvety swells of the Pacific, with a western horizon of sea and sky faint in the distant haze.

THE SOURCE AND ADEQUACY OF OUR MAPS

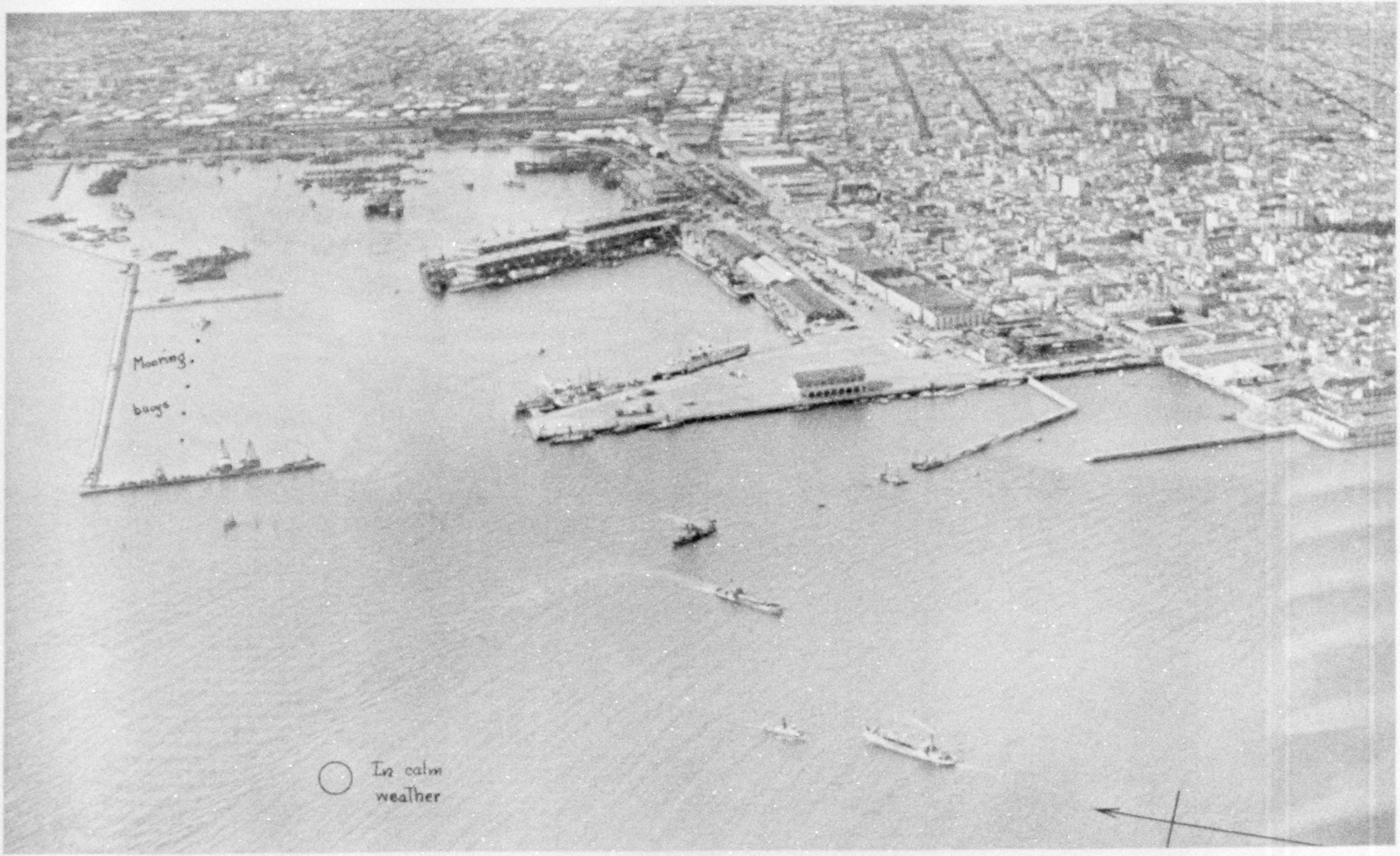
When it was Whitehead's turn to fly our ship I studied maps and made notes.

In picking our general route, no maps were more useful than those issued by



OVER THE ANDES THE AMERICANS FLEW—WITHOUT SEEING THEM

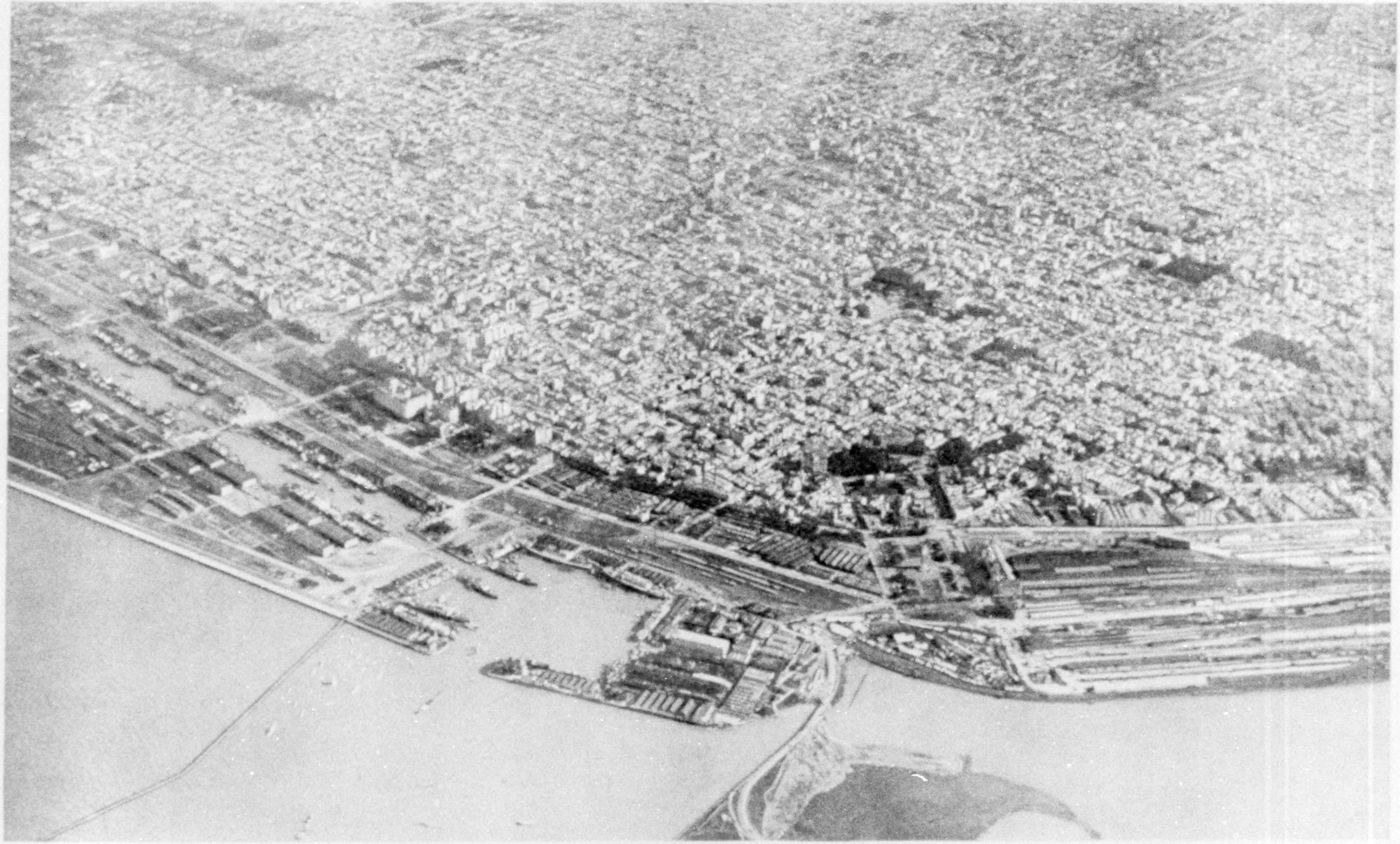
Through dark clouds Major Dargue and his companions groped their perilous way, climbing to 12,000 feet in their nonstop hop from the Pacific to the Atlantic. Winding along the mountain side is the Transandine Railway, with a grade of more than 2,000 feet in 7½ miles, through the Juncal Valley of Chile (see, also, text, page 481).



Photograph from Major H. A. Dargue

PHOTOGRAPHS OFTEN GUIDED THE FLYERS

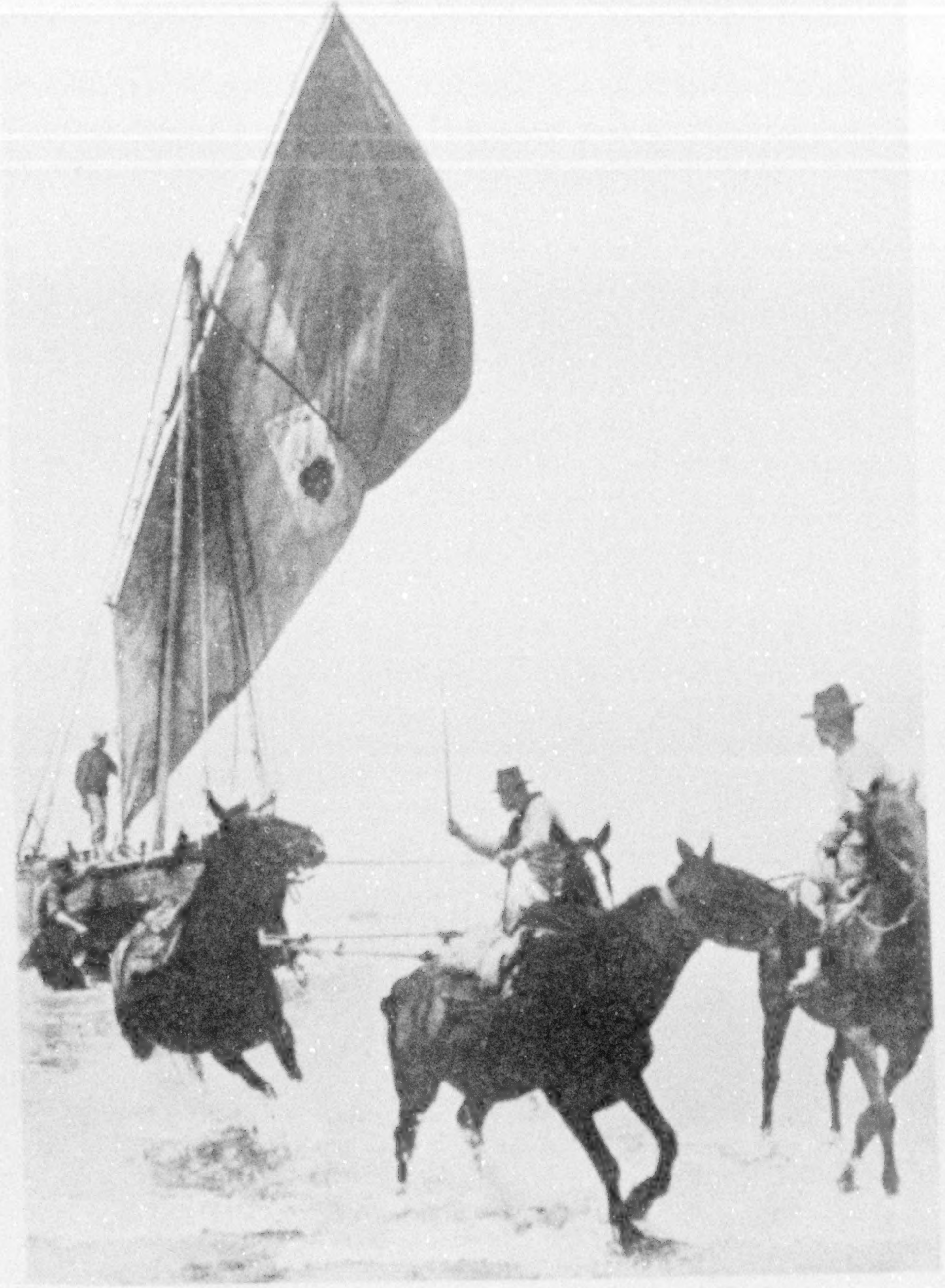
"Time and again," said Major Dargue, "photos aided us to get a quick mental picture of new landing spots ahead. One good photograph of a flying field or harbor tells more than many pages of words. Undoubtedly, in future air congresses, the aerial photograph will play an important part in setting forth facilities that may exist at various places, as well as help identify landmarks along any particular air route." This is the waterfront of Montevideo, capital of Uruguay (see text, page 493). The aviators' markings are shown in lower part of photograph.



Photograph from Major H. A. Dargue

THE WORLD PRICE OF WHEAT AT LIVERPOOL IS AFFECTED BY HUGE EXPORTS FROM ARGENTINA

Past the great grain elevators and marble palaces of Buenos Aires, millions of European immigrants have entered to plow the pampas and raise the Argentine cattle that now help feed the world (see, also, text, page 484). Air photographs, such as this of Buenos Aires, assisted the American flyers in choosing safe landing places.



Photograph by Herbert

SOROLLA MIGHT HAVE PAINTED THIS

An almost classic grouping of figures, as men and horses draw a fishing boat ashore at Mar del Plata, Argentina. It reminds one of "Beaching the Boat," a famous canvas of the Spanish painter Sorolla.

the National Geographic Society. These not only served us, but we presented copies to officials of the countries we visited.

More detailed information, necessary during local flights, was furnished by U. S. Hydrographic Office charts. These showed coast line and the depths of the water, but little as to features of terrain. So we had to pick up information from miscellaneous sources and write it directly on our maps. Since we generally followed coast lines, the hydrographic charts were usually sufficient. For such trips as that across the Isthmus of Tehuantepec or up the Magdalena River, we had to obtain special maps.

All maps were folded and marked, ready for immediate use. Two of the five airplanes carried complete sets of maps for the entire route; for the other planes, maps for future use were mailed ahead.

Before each day's flight, maps to be used were carefully studied.

Harbor charts were also used extensively, especially at those places where landings were scheduled. Each complete set of maps, with its supporting papers, weighed about 50 pounds. Information gathered by advance officers was often noted by them on the maps furnished. This helped us to identify points en route. So much for preparedness.

OFFICE WORK DONE IN THE AIR

The amount of administrative work on a flight like this is hard to realize. Hundreds of letters and telegrams are received; many must be answered. Besides, there are diaries to keep, reports to make, and naturally one likes at least to remember the home folks with an occasional letter.

We took turns about in flying, as all officers were pilots. When one of us was not piloting, he would have his work spread out before him in the rear cockpit, keeping it up to date. It was not uncommon to write continuously for many hours at a time.

The Andes lifted their heads as we neared the rainy Colombian port of Buenaventura, a small cable station of many ships but no automobiles. Along dreary jungle coast line, we flew for Tumaco, another small Colombian seaport near the frontier of Ecuador. Here a bad thrust-bearing left the *San Antonio* helpless on the beach. For 19 days Captain McDaniel and Lieutenant Robinson sat and bemoaned their luck, awaiting a new engine from Panama. To keep falling coconuts from pounding holes in their plane's wings where it lay, in the edge of a grove, they climbed the trees and picked the coconuts. A flyer's education is constantly expanded.

Now, through torrential tropic rains, we fairly swam in water and air and jumped safely over the Equator to Guayaquil. In the river there, amid singular floating islands with small trees growing on them, we anchored and went exploring this unique country of quinine, "Panama" hats, and ivory nuts.

The number, horsepower, and speed of the bugs found all down this coast was astonishing. At one small hotel an extra spoon was given us for use in helping crickets from our soup!

Ecuador's thinly peopled coast, first jungle-choked, then rough and rocky, is no paradise for aviators in dark, rainy weather. To avoid possible collisions, we flew close together, like ducks. Nearing Paita, Peru, we rounded a great point.

Here, with amazing abruptness, we seemed to quit the equatorial rain belt. Now we flew into that dry South American west coast section, where, we heard, the last rain fell more than 30 years ago. The only signs of plant life we saw were the far-away strips of green sketched against foothills, where melting snow sent streams down to the sea.

AN AIR CRUISE IN THE SHADE OF THE ANDES

It makes picturesque flying, however. For hours, in the morning, we were in the shade of the mountains, as they rose near the sea to a height of 8,000 or 9,000 feet. Beyond these was a level plateau for a few miles; then the Andes rose to scratch the skies, their peaks along the distant skyline glistening with snow in the bright sunlight. Along here one can fly for hundreds of miles without seeing a sign of habitation or any grass or trees.

Arid and barren, this Peruvian coastal plain is yet rich in oil and copper. Its reddish and purple hills reminded us of Arizona and the Canyon.

Landing on the military flying field at Las Palmas, near Lima, we were met by Peruvian Army flyers. To the President of Peru we delivered the message we carried from President Coolidge.

Along 550 miles of dry, rugged coast we sped, from Lima to Ilo. What looked like floating logs at one of these Peruvian ports frustrated one of our planes in repeated efforts to take off. Just when the ship was getting enough speed to lift itself from the waves, these obstacles would suddenly appear dead ahead and, to avoid puncturing a pontoon and sinking, the plane would have to slow down and veer off. Just then one of the "logs" poked its head up right beside the plane. It was a smug-faced sea lion with a mustache like a pair of whisk brooms. In these waters, we learned later, thousands of these creatures are often seen.

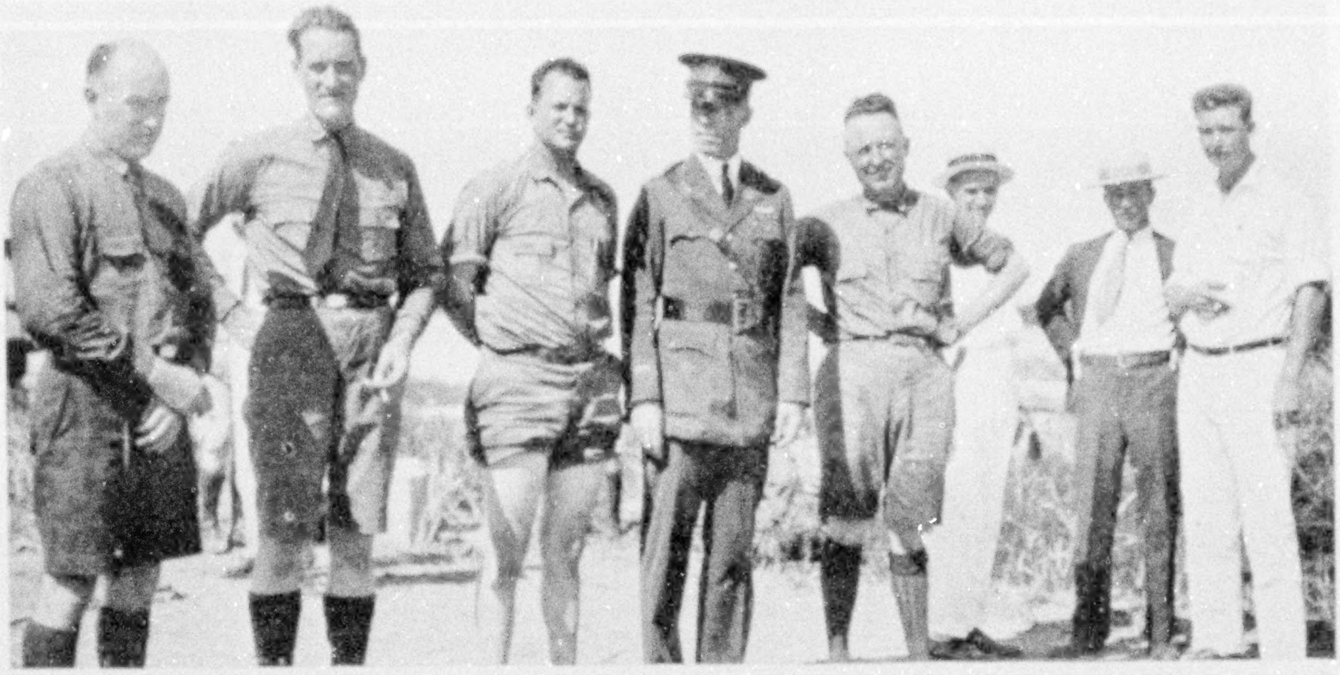
From Ilo we wanted to fly to Bolivia; but we couldn't. The altitude of the Bolivian flying field was somewhat higher than we cared to climb our heavy planes. So some of us went to La Paz by train, via beautiful Arequipa, a town of flower gardens framed in snow-capped peaks.*

Probably 15,000 people met us at the station in La Paz. They carried us on their shoulders, crying, *Viva Los Estados Unidos! Viva Los Aviadores!* On us their president conferred the Order of the Condor.

What interested us very much as aviators was the excellent flying of the Bolivian Army airmen, taking off from a field 13,500 feet above sea level!

Going out to Lake Titicaca for a ride in the odd straw boats and a glimpse of the Inca ruins, we passed many burden-bearing llamas and alpacas. The silly-faced llama, with its chronic sneeze, they told us, might well be used by the Bolivian Bureau of Standards, for it lies down the instant that an ounce more than 50 pounds is put on its back! On the mountain slopes, running wild, we saw many head of vicuña, that innocent-looking, fur-bearing animal of the Andes.

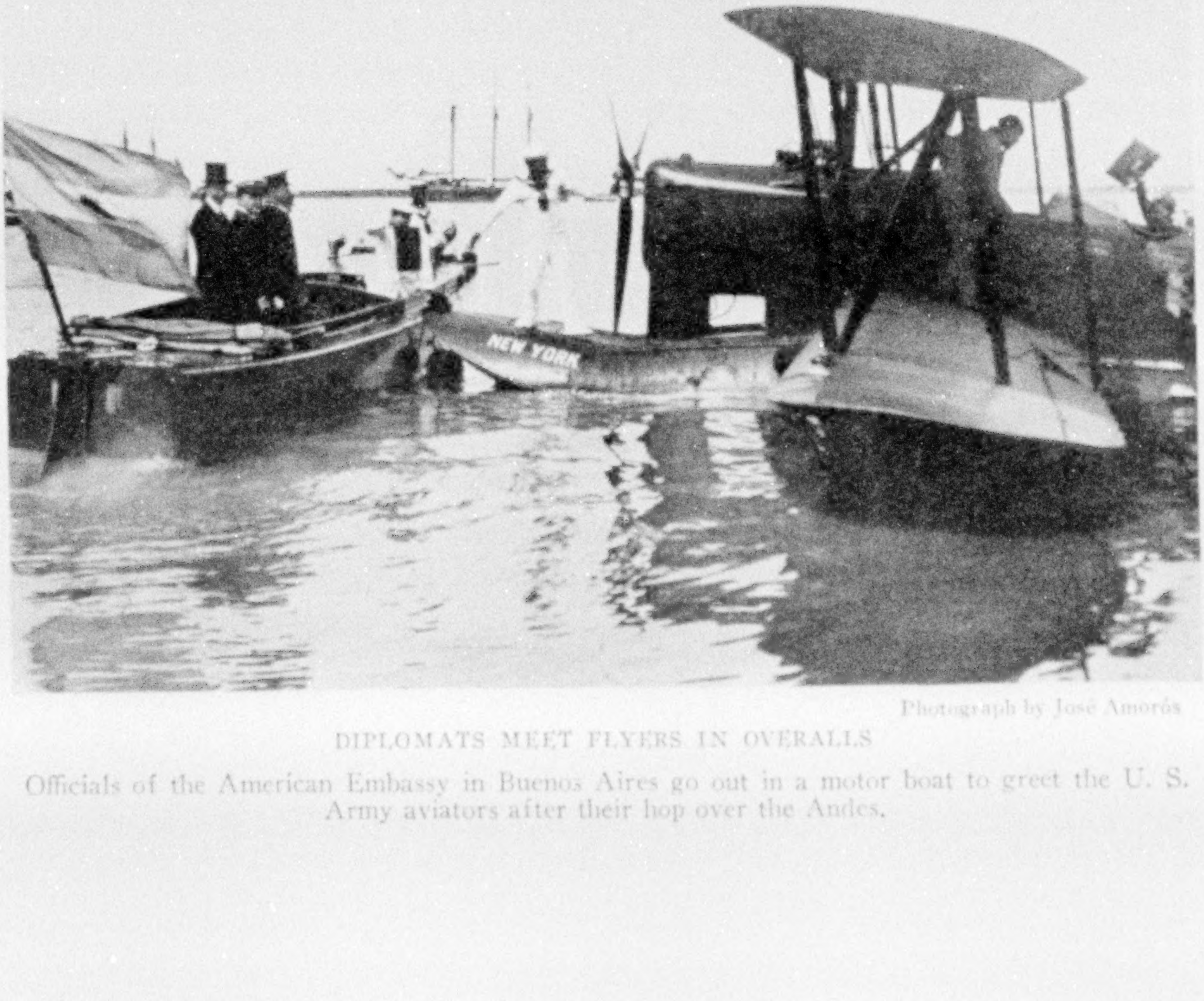
* See, also, in the NATIONAL GEOGRAPHIC MAGAZINE, by Harriet Chalmers Adams, "Kaleidoscopic La Paz: the City of the Clouds," February, 1909, and "Some Wonderful Sights in the Andean Highlands," September, 1908; and "The Heart of Aymará Land," by Stewart E. McMillin, February, 1927.



Official Photograph, U. S. Army Air Corps

TO SAVE SPACE FOR NECESSARY EQUIPMENT, THE FLYERS CARRIED LITTLE CLOTHING

Spare parts, tools, anchors, and other equipment, including fifty pounds of maps, left each flyer room for only one small suitcase.



Photograph by José Amorós

DIPLOMATS MEET FLYERS IN OVERALLS

Officials of the American Embassy in Buenos Aires go out in a motor boat to greet the U. S. Army aviators after their hop over the Andes.

Leaning out of our cockpits, after resuming our flights from Ilo, we looked down on that disputed area called Tacna Arica. Judging it only by scenic aspects, we wondered that Peru, Chile, and Bolivia should attach so much importance to it. Barring a few irrigated patches, as far away as we could see, it was dry and empty as parts of west Texas. On a desert plain sprawls the adobe village of Arica itself. From the air, it reminded me of flying over Tombstone, Arizona.

Due south 1,295 miles, down the long, straight-line, rough coast of Chile we flew, stopping now and then or dropping notes into the streets of towns like Arica, Iquique, and Tocopilla, as we passed.*

Soaring over Valparaiso, Chile's great seaport, we headed inland for Santiago, the capital. Circling above at sunset, we were struck by its size and magnificence. Laid out on a high, level plain, at the western feet of the snow-capped Andes, and dotted with symmetrical parks and plazas, here is indeed a city of beauty, the acme of Latin American architectural achievement. We were loath to leave it. However, after three days of entertainment and hard work on our planes, we were off. Here, as elsewhere, our hosts were astonished to see officers acting as their own mechanics.

Four hours' flight south, still along the Chile coast, we passed over the busy port of Concepción, center of a wheat, wool, and wine country at the mouth of the Bio-Bio. In his "Voyage of the *Beagle*," Charles Darwin vividly describes an earthquake which ruined this town in 1835. Near it now stands the Chilean Naval Base of Talcahuano.

CHILE'S LOWER COAST LINE AS WET AS PUGET SOUND

Streams, forests, green fields, and herds of sheep and cattle told us now that again we were in a temperate zone. Rains increased. Below Talcahuano it rained so hard we had to fly close together, barely above the breaking surf. Salt spray hit our machines, and the weather grew so thick that, with our planes flying almost wing over wing, it was at times barely possible to see the other fellow.

It was dark when wet, foggy Valdivia, built of wooden houses and looking much like Seattle in 1900, blinked at us through the rain. Here is a rough pioneer town of German colonists clearing forests and building homes. Kindly they helped us beach and care for our planes.

Before us now loomed the giant jump over the Andes. "We haven't had a pleasant day for nine years," the natives said, as they waded about in the wet dawn to see us off.

Fifty miles inland, due east over hilly forests, we ran out of rain into clear air. Before us, and to the right and left, unrolled a stunning panorama of blue lakes and virgin woods.

PLAYING TAG WITH DEATH IN DARK CLOUDS ABOVE THE ANDES

But ahead, utterly obliterating the mountains we had to cross, were piled the biggest and thickest cloud banks we had ever seen. The whole Andean system, it seemed to us, was that morning shrouded in a universe of clouds (see page 475).

To poke our noses into those dark heights, where steep walls or unseen peaks might any instant leap from the gloom to wreck us, was no pleasing prospect. Yet there could be no turning back from bad weather. That had been our understanding from the start.

I signaled to circle and climb. It was our only chance. Whether our four heavy planes could make it, only the attempt itself could decide. Round and round we climbed, roaring and throbbing, higher and higher, colder and colder!

At 11,000 feet we were still dragging our tail skids through the clouds, groping for light and vision, if one can "grope" at 90 miles an hour!

Somewhere to the east we hoped there would still lie the sunny pampas of Patagonia; but, after two hours of climbing, Patagonia seemed even more remote than in our schoolboy days, when we read of its wild tribes and the stormy straits of Tierra del Fuego!

Suddenly, at 12,000 feet, we burst through the dark mists and shot out upon a vast, glistening, white cloud sea. Behind us an icy peak thrust its head through the

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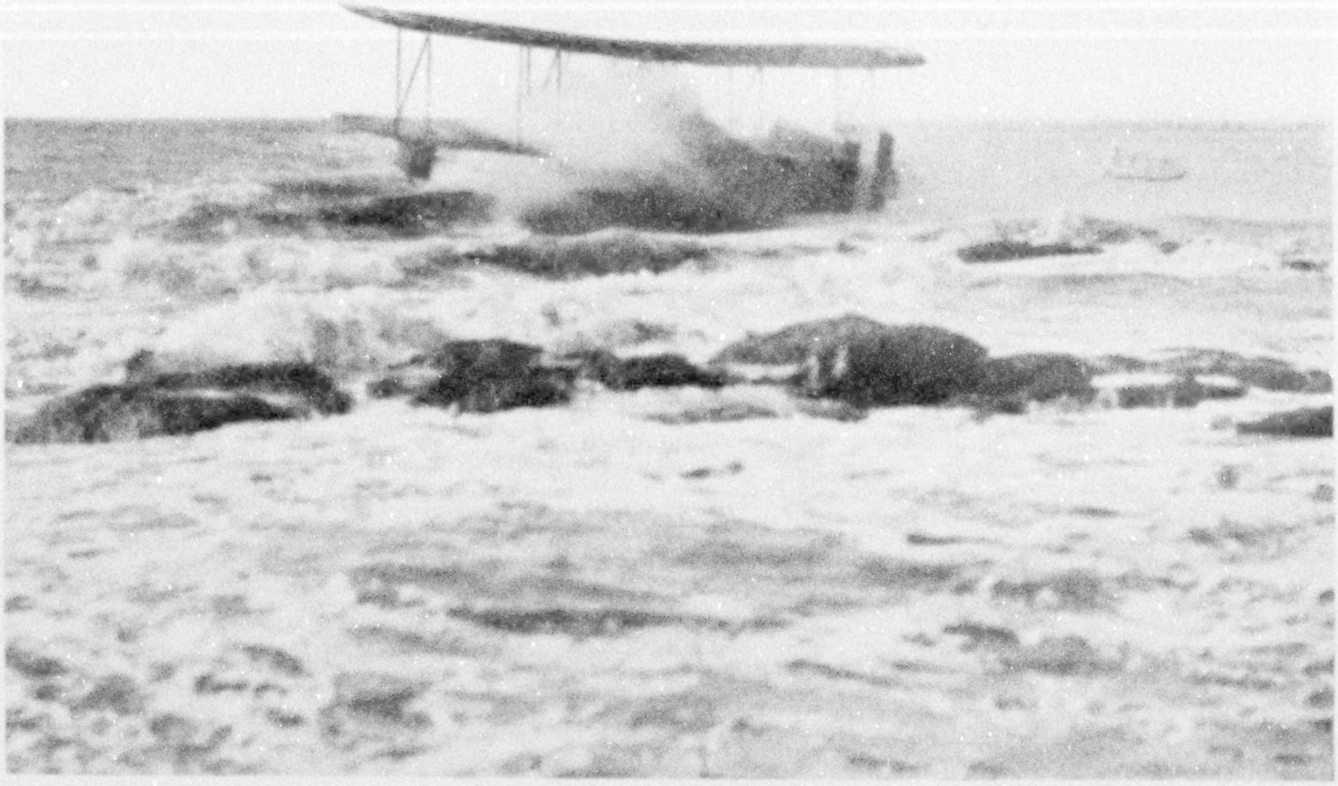
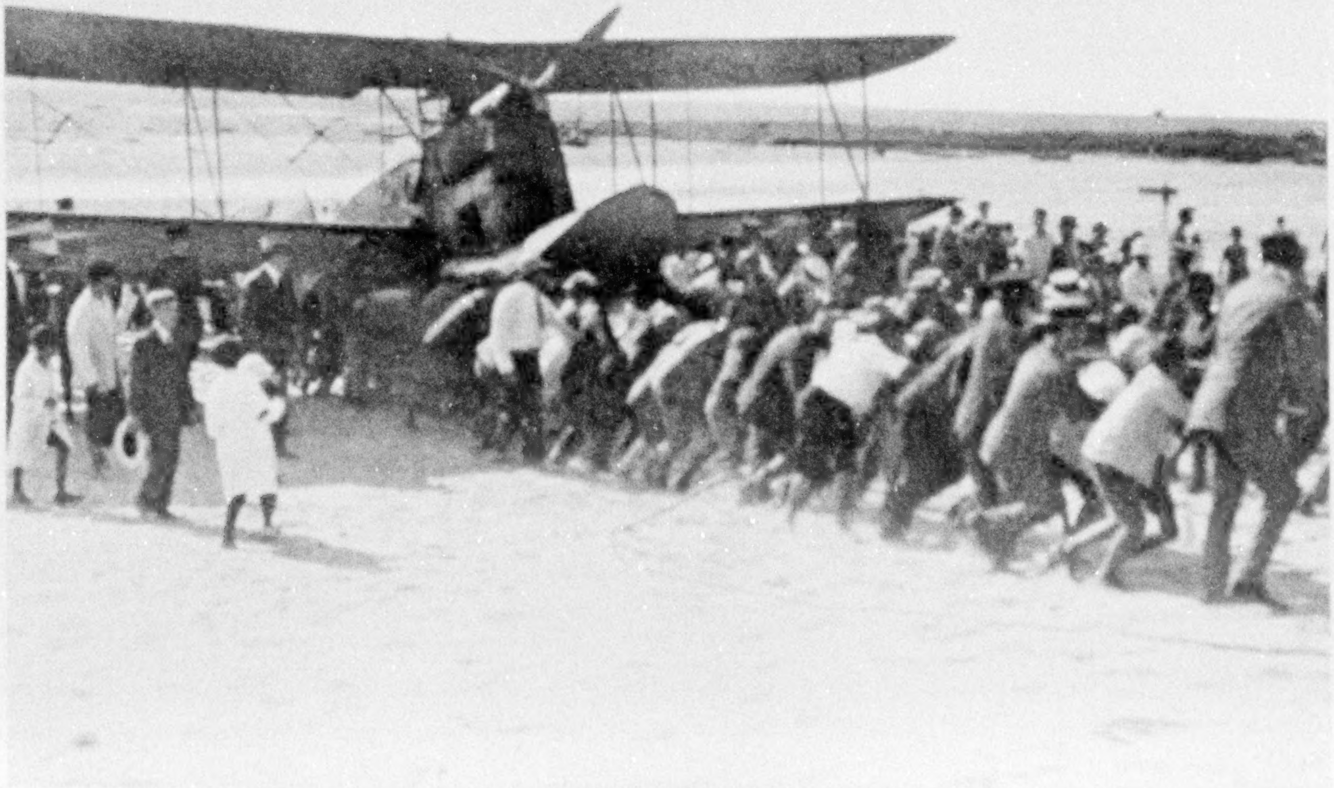
* See, also, "A Longitudinal Journey Through Chile," by Harriet Chalmers Adams, in the NATIONAL GEOGRAPHIC MAGAZINE for September, 1922.



THE "SAN FRANCISCO" IS NEARLY WRECKED OFF MONTEVIDEO

On high seas salt water flooded this plane's carburetor and stopped its engine. Then its anchor line broke. Just as it was about to smash on the rocks, Captain Eaker got the engine started (see text, page 494).



Photographs by A. Olergue

A FRIENDLY MONTEVIDEO CROWD HELPS BEACH THE "SAN FRANCISCO"

Throughout their long cruise the American flyers found the people of Latin America deeply interested in airplanes. More than once, where mud or loose sand made it difficult to move the heavy planes on land, the local inhabitants gladly lent a hand.

cloud floor. Without knowing it, flying as men blindfolded, we had actually climbed the great Andean range and crossed its summit!

It was now so cold that a bottle of water was frozen solid. To get down now and thaw out was our one big idea.

ONE SHIP FOUNDERS IN SEA OF CLOUD

Six thousand feet lower, boiling hot winds tossed us madly, but at least we were warm again and could use our hands and move our legs. "How I love the great open spaces," my partner scribbled. Below, for infinite miles, lay that Promised Land, the pampas. In a few hours we hit Bahia Blanca, a nonstop, over-the-Andes jump from Pacific to Atlantic.

But the *San Francisco,* flown by Captain Eaker, was not so fortunate.

"Somewhere over the Andes," he says, "my engine began to cough and spit and we began to come down. . . . We had either to take our parachutes and jump out or else nose the plane down and trust blind luck not to crash on some invisible peak. Had we been flying in the United States, we certainly would have jumped. . . . But our one great hope was to finish this Pan American flight and bring the good old *San Francisco* safely back home.

"Also, we figured that sitting on some isolated Andean peak, holding a lone parachute in our laps, wouldn't be much better than lying on the same peak in a mess of airplane wreckage. So we stuck to our ship.

"For 8,000 feet we slid down through obscurity. Each second, we knew the next might be our last.

"But that day the air gods were kind. Like a glimpse of paradise, through a cloud gap a lake appeared below us. We breathed again. . . . Nearly eight hours afterward, flying by compass, we came to rest on the Atlantic Ocean."

Photograph by Ewing Galloway

A CHARMING SEÑORITA OF PARAGUAY

AROUND THE COAST OF ARGENTINA

From Bahía Blanca, busy shipping its wool and wheat, we sailed early, rounding the 565-mile coast of the great Buenos Aires Province and landing at Mar del Plata (see page 478).

This Mar del Plata, or "Sea of Silver," is something like our Atlantic City, with its *Rambla,* or promenade, corresponding

Photograph by Arthur H. Fisher

ON WATERFRONTS AROUND THE WORLD MEN ARGUE THE PRICE OF FISH

This regattalike fishing fleet reaches Pará on the early morning tide, bringing iced fish from Vigia, 400 miles away on the Atlantic coast.

to the boardwalk. A "human fair," it has been called, where the Argentine world of wealth and fashion comes to see and be seen. Here perennial visitors have their own villas and chalets; but much of the more giddy social life centers around the expensive hotels and cafés. At the glittering casino, where gambling is licensed, stakes were so stiff that no ordinary aviator could sit in.

Flying on up the 30-mile mouth of the Rio de la Plata, we landed beside an Argentine battleship in the harbor of Buenos Aires and were received aboard this vessel (see page 477).

Then again upstream, past Buenos Aires. Along the water front of this mighty city we flew. To its long row of giant grain elevators, that tower above the harbor, ships of all nations come for corn and wheat. Through this open doorway 4,000,000 European settlers have passed, to plow the pampas and raise the cattle that now help feed the world.*

Marble palaces gleamed through the silvery haze and long tree-bordered *avenidas* came into view, as we sailed over this city of palatial homes, luxurious clubs, and sudden wealth. Below us now spreads out the symmetrical race-course map of the Hipódromo Argentino, owned by a jockey club said to be the richest in the world. The rugs, paintings, and furniture in its clubhouse are far superior, we were told, to those enjoyed by the average king.

Ahead lay the beautiful, flat, government flying field, called Palomar, our immediate objective. It was a calm day. We were all serene, in pleasant humor; we

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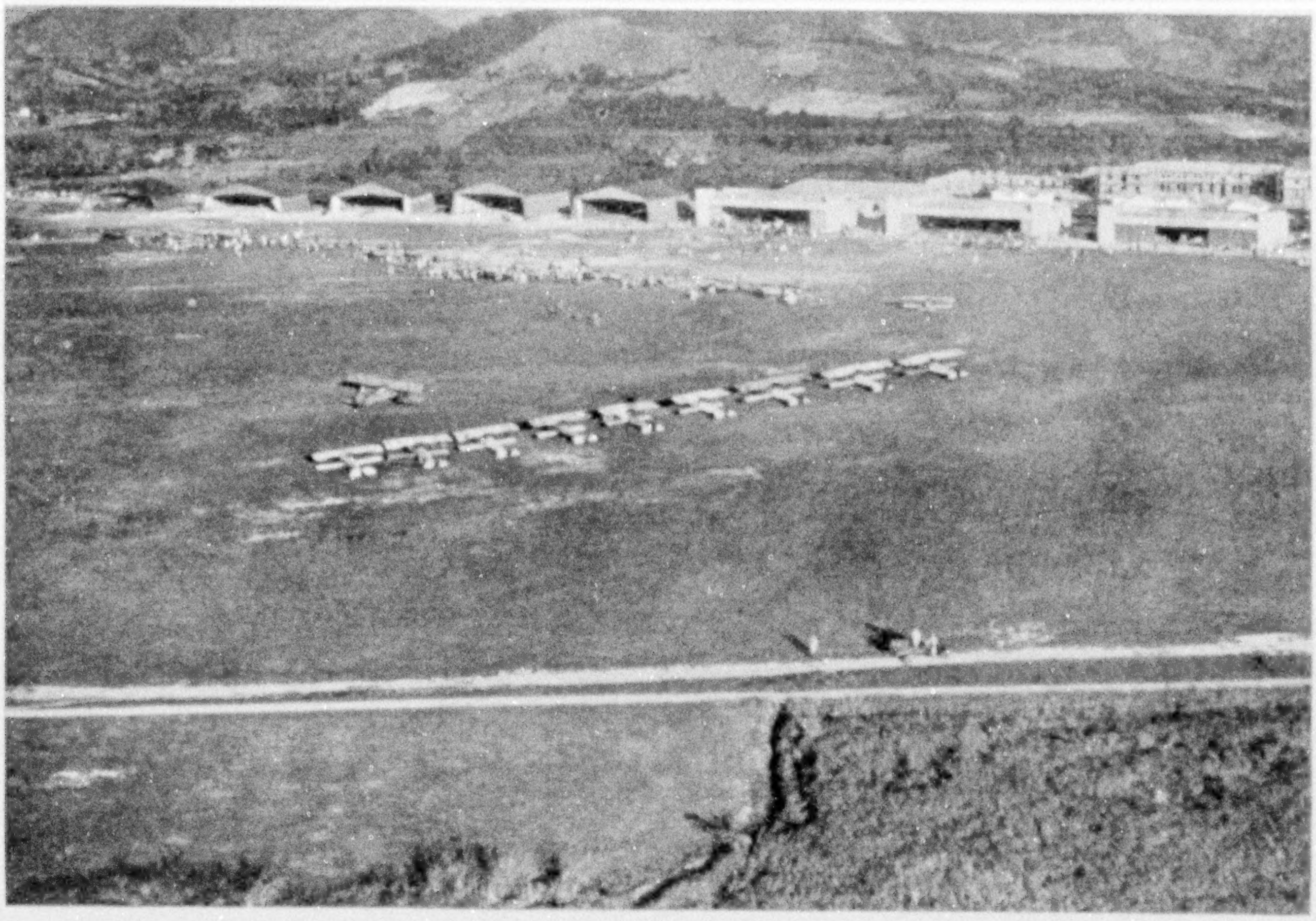
* See, also, "Buenos Aires and Its River of Silver," by William R. Barbour, in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1921.



Photograph Courtesy Brazilian Air Service

BRAZILIAN ARMY PLANES LINED UP ON THE FIELD AT RIO DE JANEIRO

were confident that, now across the Andes, our real troubles were over. And yet Woolsey and Benton, two of my courageous companions and two of the best aviators who ever flew a plane, were to "go west" in a few seconds.

DEATH TAKES ITS TOLL

No man may ever fully explain how disaster came. It was all over too quickly.

We had never flown a more perfect formation. I was in the lead, piloting the *New York*, the *San Francisco* at my right rear, the *Detroit* in a similar position on the left. Behind, the *St. Louis* closed the diamond. An escort of three local planes flew with us.

I gave the signal to break formation, preparatory to landing, just after passing over Palomar flying field.

After seeing the *Detroit* turn up and away and going apparently far to my left rear, I glided gently downward and started a very slight turn to get in a position to make a landing. My attention was given to locating, over the right side of my plane, an Argentine flyer who had passed diagonally beneath me.

It was only a matter of seconds when I glanced up and to the left. I caught a flash of black and yellow slightly higher and just off the rear of my left wing.

Then we crashed.

The collision could not be averted.

Too much happened within the next few seconds for any brain to grasp it all.

Two planes fell as one in a violent spin. Wreckage was flying all about.

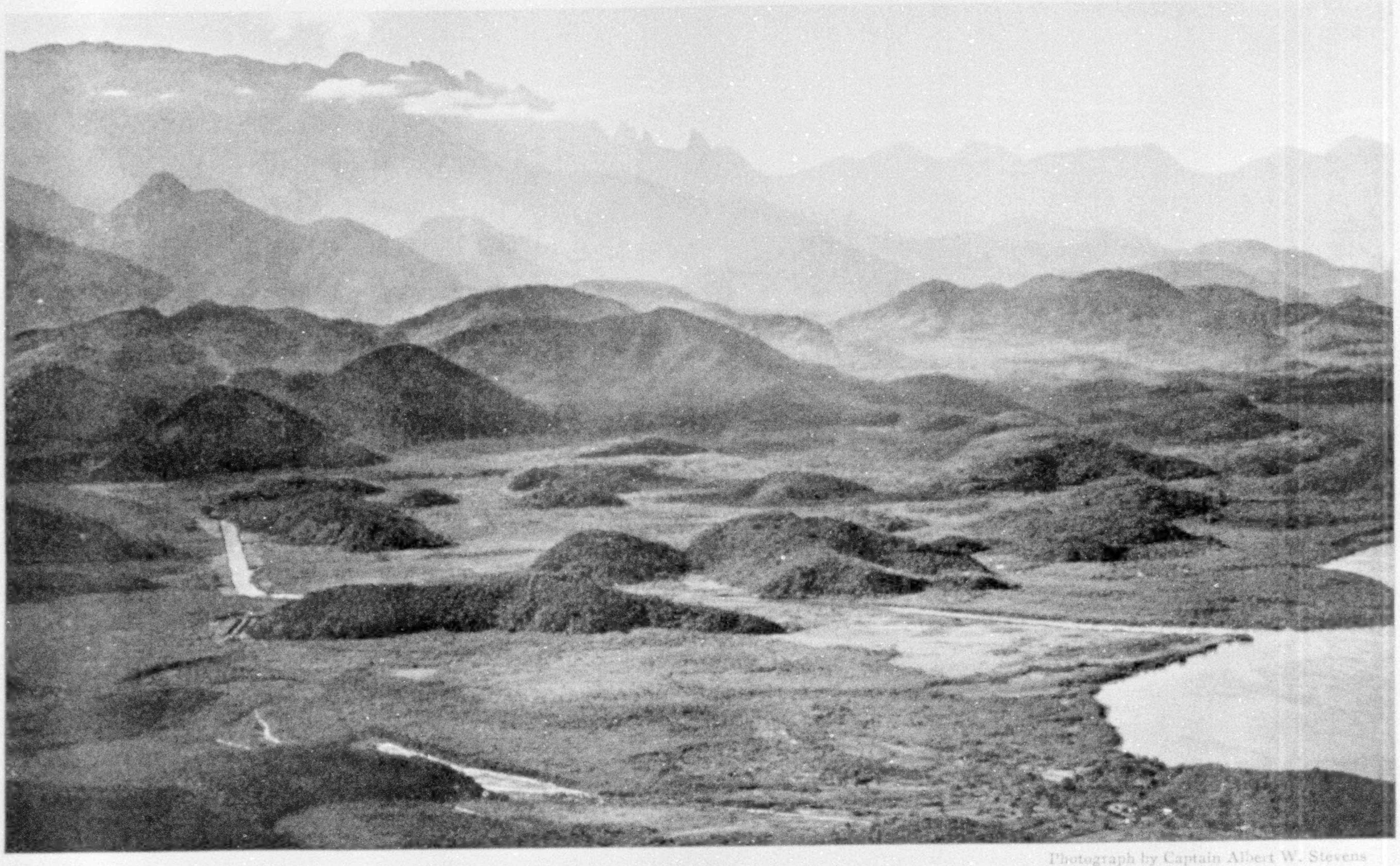
I loosened my safety belt, and my effort to get free was aided by the centrifugal force of the spin. I was literally thrown out. The spinning mass hit me a terrible thud in my left side just as I pulled my parachute.

Now my chute was fouled, entangled in the falling wrecks. As we neared earth at terrific speed, I concluded this was the end.

But the planes suddenly broke apart. My silken cord commenced to tug at my shoulders. I was out in the air.

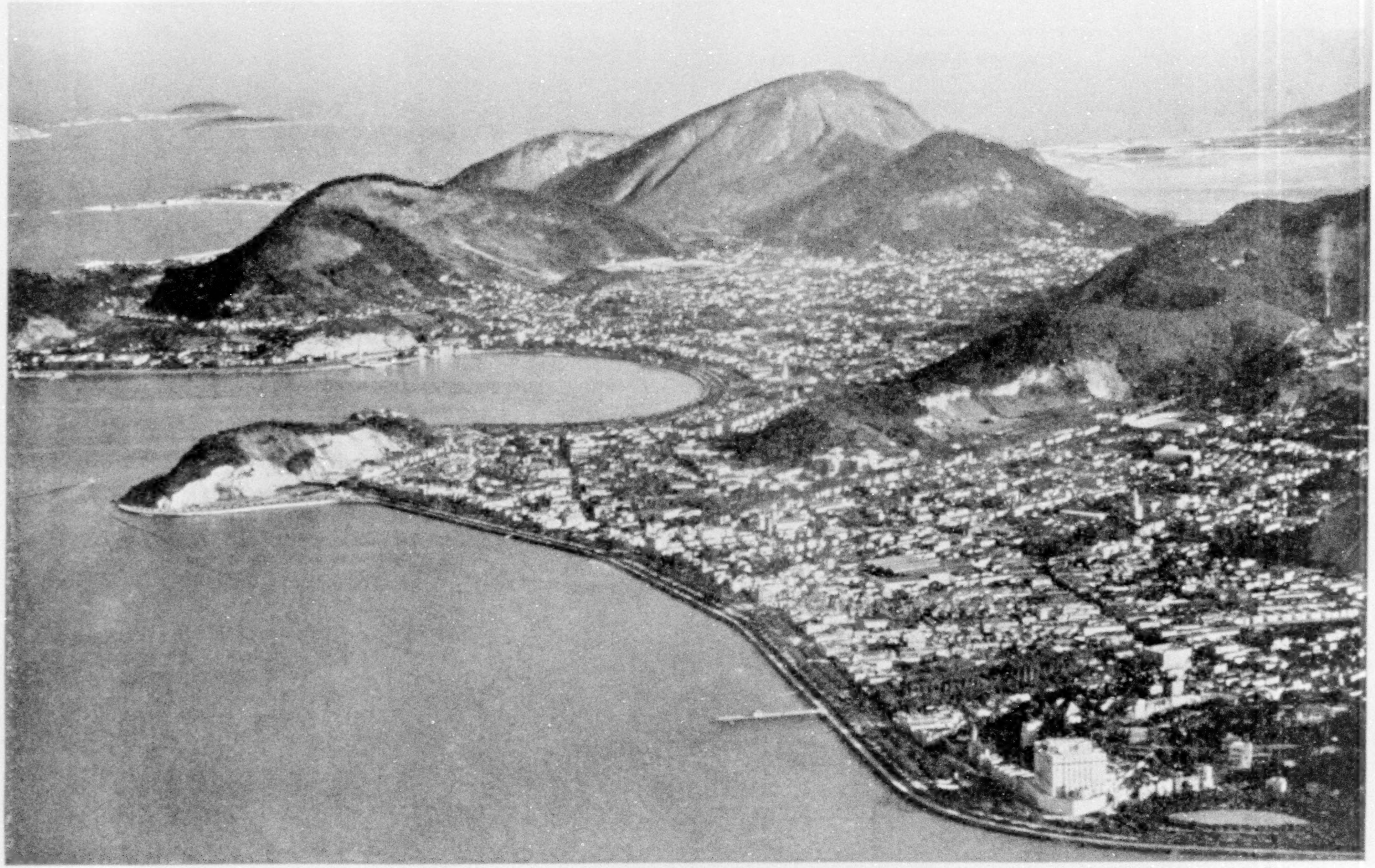
Two great pieces had been torn from my chute; a rip extended from skirt nearly to crown and broken shroud lines dangled loosely.

In falling I had only time to glance upward and see another parachute and



Photograph by Captain Albert W. Stevens

THE "FINGERS OF GOD" CLUTCH AT THE HEAVENS ON THE SKYLINE NORTH OF RIO HARBOR

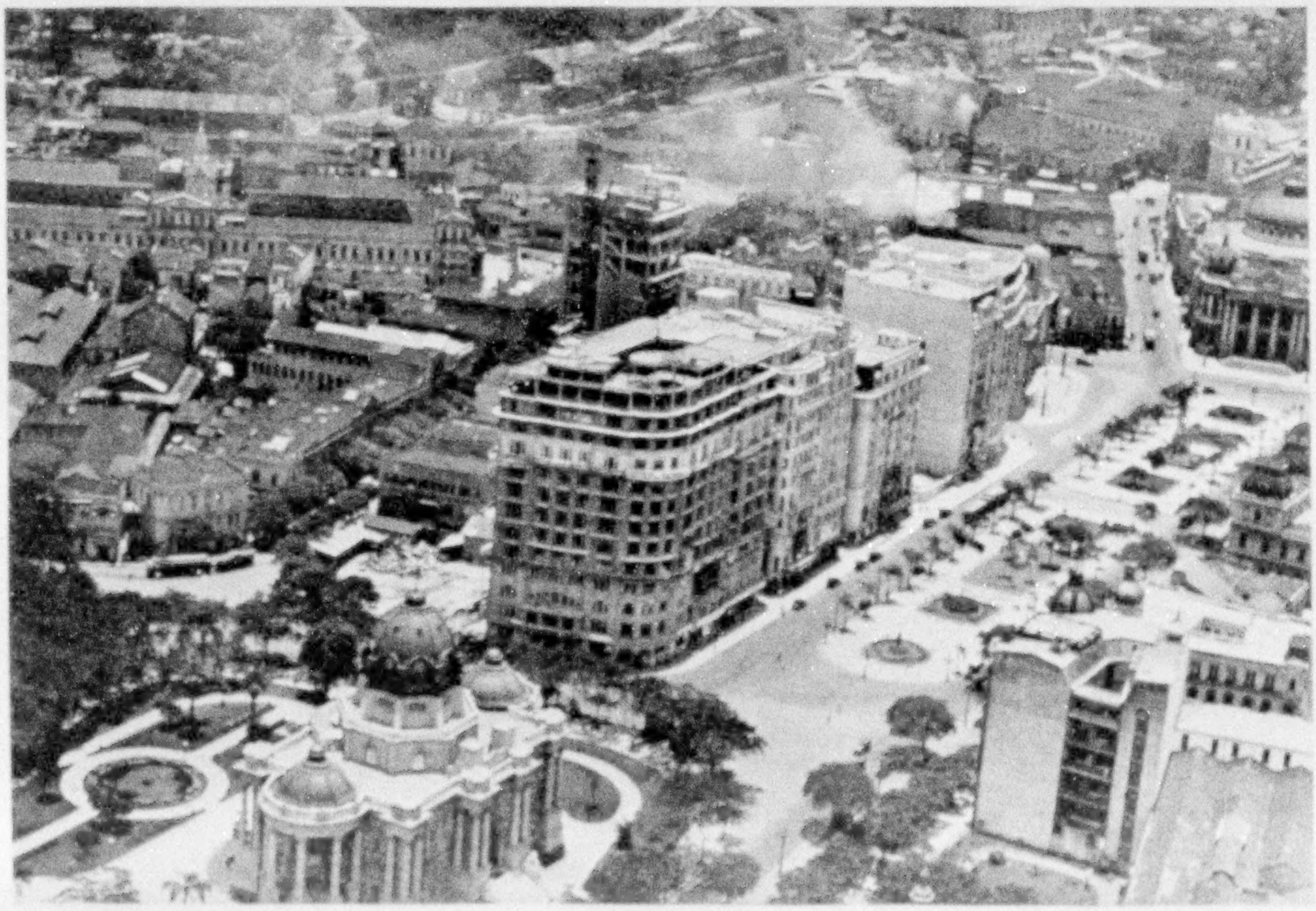


Photograph by Captain Albert W. Stevens

MAN CROWDS HIS GIANT CITIES BETWEEN SEA AND MOUNTAINS WHEN WORLD TRADE DEMANDS IT: RIO DE JANEIRO

Photograph by Alice Schalek

SANTOS, BRAZIL, SHIPS MILLIONS OF BAGS OF COFFEE EVERY YEAR



Photograph Courtesy Brazilian Air Service

FOR COFFEE AND NUTS THE WHOLE WORLD TURNS TO BRAZIL

Huge profits from field and forest have brought beautiful buildings to Brazilian cities. In the left foreground is the Monroe Palace at Rio de Janeiro.

several pieces of wreckage far above. Then a double crash occurred right beneath me. The *New York* and the *Detroit* had made their last descent, and the cause of international amity had martyred two of our cherished comrades.

I hit the ground hard and Lieutenant Whitehead landed a couple of hundred yards from me.

DARGUE AND WHITEHEAD JUMP FOR LIFE FROM FALLING PLANE

From the diary of Lieutenant Whitehead, who was in the *New York* with me, I take this description of the accident:

> "*Detroit* was turning right and nosed down apparently, and *New York* was turning left slightly and losing but little altitude. Planes were very close and collided almost immediately. Both planes fell as one for a few seconds, and then *New York* spun very fast to left. Tools, parts, papers were flying out of the rear cockpit of the *New York*. Pieces of wing seemed to fill the air. The *Detroit* seemed to have the rear cockpit of the *New York* blocked for a time, until *New York* began fast spin.
>
> "I unloosened belt, and something which I took to be Major Dargue went out of the front cockpit. I thought that the tail of the *New York* got him. I unloosened belt, climbed up a bit, and had difficulty in staying in until I was set to dive out. Pushed off with right foot, which was hit very hard at the ankle by the tail of the *New York*. Located plane, which was turning toward me in spin, and when I seemed clear pulled rip cord, which I lost.
>
> "Parachute opened very quick. The ripping sound of the shroud lines out of the pack surely did sound welcome. Saw *Detroit* hit and burst into flames, and an instant later the *New York* hit a few yards away. Looked around for other parachutes and could locate but one. It seemed to have several large holes in panels and was descending faster than I was. Could locate no others in parachutes.
>
> "A nice plowed field was below me. Pulled off shoes to keep from turning my ankles. Watched first parachute land all right. Dropped my shoes when about fifty feet in air and landed with but little shock."

The people of Buenos Aires could not have been more considerate had Woolsey and Benton been two of their own favorite flyers. The President of Argentina and all his cabinet marched in the funeral procession. It was a hot day and the Minister of Marine fell in the street with a heart attack and died three hours later.

Woolsey and Benton had left us. They had gone on an eternal mission of good will. How we missed them none will ever know. No two men could have contributed more to the success of our great undertaking.

President Coolidge, in his message of good will, which we carried to Dr. Marcelo T. de Alvear, President of the Argentine Republic, stated:

"I trust that Your Excellency will see in the visit of these American flyers another evidence of the ardent desire of the Government and people of the United States to promote good understanding and better acquaintance between the two governments and peoples—an object which was the chief motive inspiring the undertaking of the voyage."

THE VALLEY OF THE PARANA LIKE THE LOWER MISSISSIPPI BASIN

We carried on with heavy hearts.

Five planes had started. Two were wrecks at Palomar. One, delayed in Ecuador, was speeding to join us.

With only the *St. Louis* and the *San Francisco,* we headed over the long, island-peppered delta of the Paraná, on an 800-mile upstream flight to Asunción.

This yellow river is so wide that often we could barely see across it. In places, islands literally crowd it. As we flew upstream and watched the islands sliding under us, I had the illusion that all these mud-made isles were being borne down to sea by the yellow tide.

In fact, islands *do* float down, in flood times, we were told—islands of uprooted vegetation from the jungles of Brazil—and tapirs, deer, jaguars, and other wild animals have been seen ocean-bound on these runaway bits of jungle.

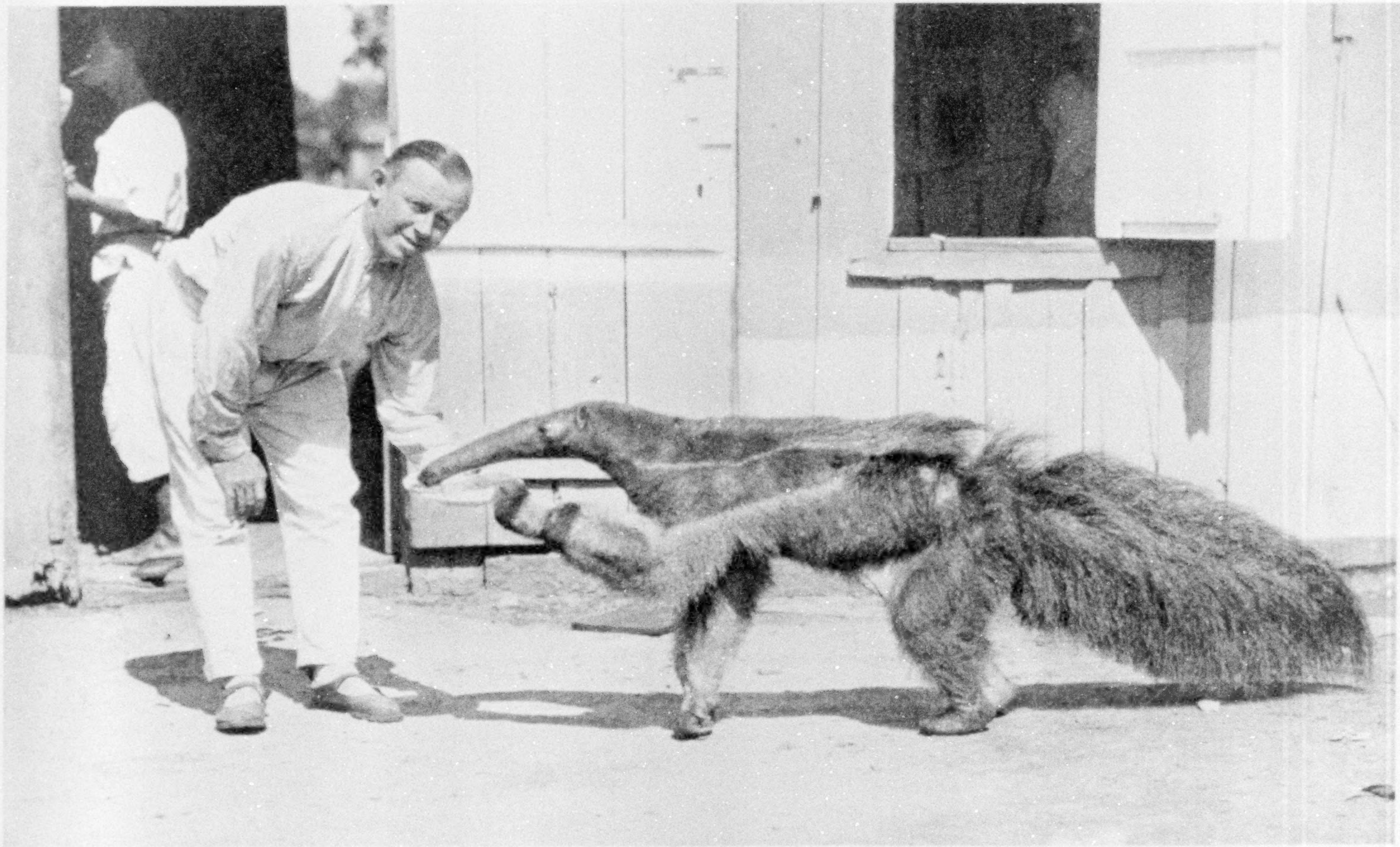
Above the delta, we began to glimpse the vast wheatlands of Argentina. Mills and elevators marched past, and busy towns built by wheat. So great is the crop here that now Argentine wheat exports affect the price American growers may get in the world market at Liverpool.

In size of products this Paraná Basin reminded us of the Mississippi Valley. Both grow cotton and sugar, wheat, corn, and cattle. Like the Mississippi, the Paraná drains an enormous area, including the best of Argentina, all of Uruguay and Paraguay, and parts of Brazil and Bolivia.

Photograph by Frederick I. Monsen

LA GUAIRA IS ONE OF MANY OIL FIELD DEVELOPMENTS ON THE VENEZUELAN COAST

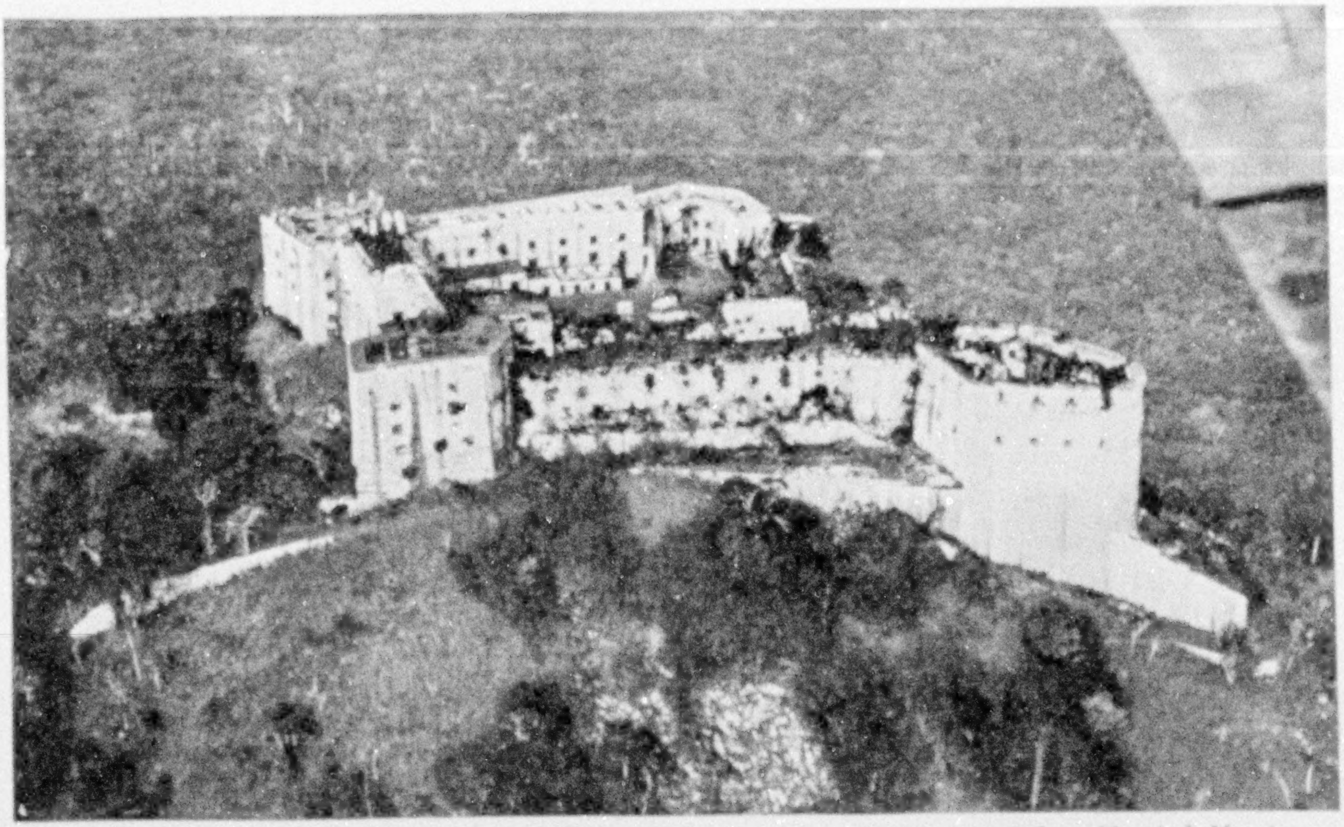
On his third voyage, in 1498, Columbus and his crew were the first white men to see Venezuela. Here they found scores of tribes of Indians. To the Spaniards these aborigines offered fiercer resistance than any other tribes in America. Around Lake Maracaibo, important oil fields are being developed, and from Venezuela came the asphalt used to protect the New York subways from seepage.



Photograph by Arthur H. Fisher

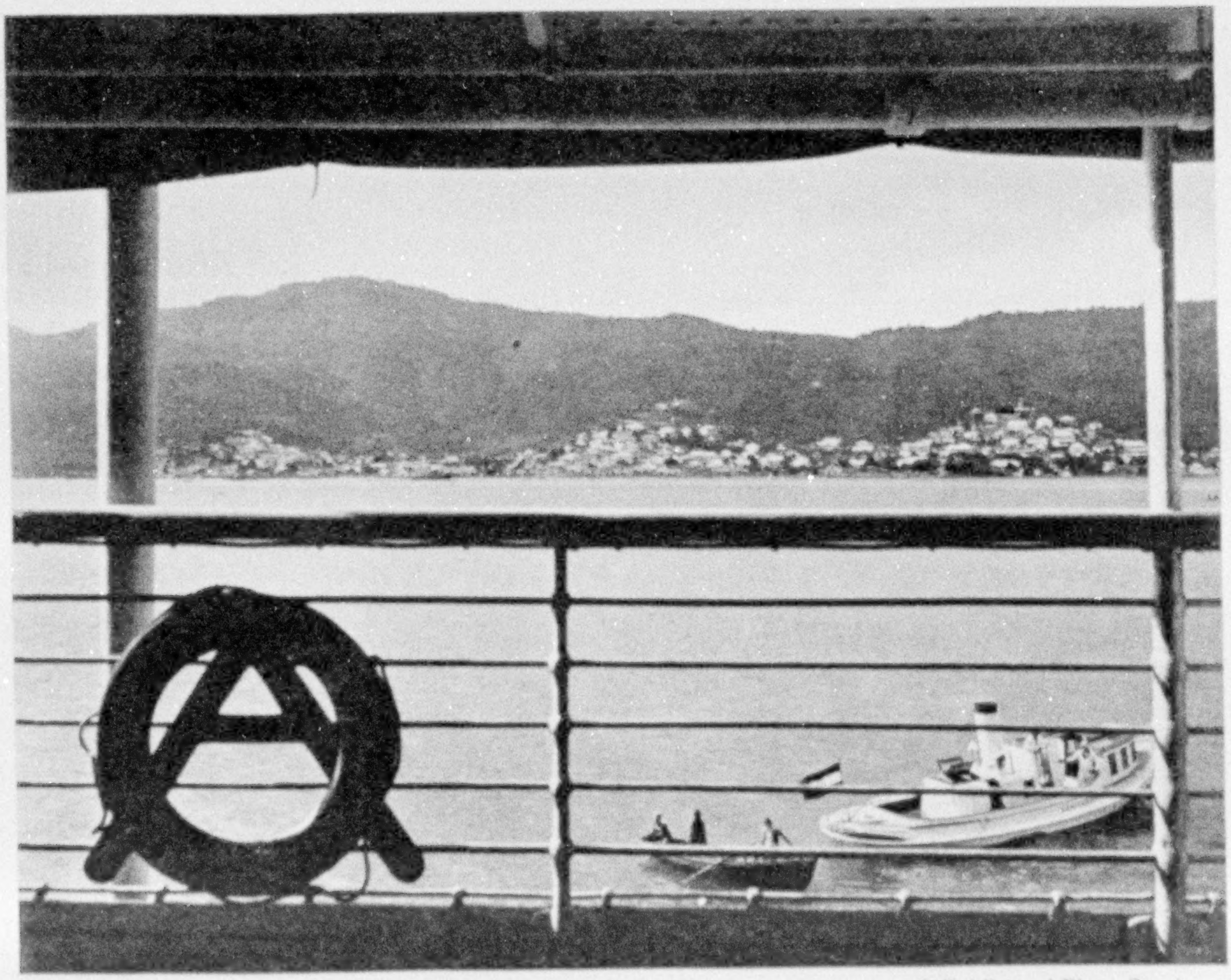
TEACHING TABLE MANNERS TO A GIANT ANTEATER

This odd creature seems to enjoy a plate of eggs and milk served by a German wild-animal dealer at Pará as much as it would a dish of fresh ants. In the vast, unpeopled jungles of Brazil, myriad wild animals still are found. Most of the Amazon Valley animals and birds seen in American zoölogical gardens were first exported to dealers in Germany and then reshipped to the United States.



Photograph from Morris J. Morrison

THE CITADEL OF CRISTOFE, BUILT BY A BLACK KING, ON A HIGH HAITIAN PEAK



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ST. THOMAS, VIRGIN ISLANDS, FROM A STEAMER'S DECK

© Publishers' Photo Service

TAKING ASPHALT FROM PITCH LAKE ON TRINIDAD ISLAND

Property owners in many an American city, assessed to meet paving costs, help pay the wages of these black workers of the British West Indian island.

Compared with ours, the seasons here are, of course, just reversed. Christmas comes in midsummer.

It was 5 in the afternoon when, after a long roar above the parrot and monkey jungles of the Corrientes frontier, we came to Asunción, capital of Paraguay. There are six women to every man, we heard, and yet no telephones!

The warm greeting given us by the Government and people of Paraguay was characteristic of Latin America and a fair example of the high speed at which we worked to keep on our schedule.

As soon as we landed, there was an official reception and banquet. Then the diplomatic corps at this capital came to meet us. Early next morning we were up to call on the President, and then on the cabinet members. Then came a lunch, a Boy Scout show, a tea, another banquet; then another reception, where we met many prominent citizens of Paraguay. It was 2 a. m. when we got to bed, only to get up at 4 and start for Montevideo.

URUGUAY HELPS FEED A CARNIVOROUS WORLD

A tiny man-eating fish infests the Paraná. It is so quick and vicious that it may grab your hand if you even hang it overboard from a boat. Schools of these hungry fish can soon completely devour a foolhardy swimmer. After hearing this yarn at Asunción, we flew back down the Paraná a bit more carefully!

In Montevideo, gay and brilliant capital of Uruguay, café tables line the shady sidewalks, as in European cities, and the sumptuous "Calle 18 de Julio" is a Paris-like boulevard famous around the world.

Montevideo makes money out of meat. We saw great packing plants where shiploads of meat are dressed and frozen for export. Many Americans live here, and from the air we saw the name of one well-known American meat packer painted in big letters on an Uruguayan roof.

TRADE BETWEEN LATIN AMERICA AND THE UNITED STATES IS ENORMOUS

Over all Latin America, we heard, about 40,000 Americans are scattered, building up trade between the Western continents.

With the twenty countries we were flying over, Uncle Sam does 18 per cent of all his foreign commerce.

Last year we paid Latin America millions for its coffee, sugar, oil, and ores. From us it bought huge quantities of iron and steel products, textiles, motor cars, foodstuffs, gasoline, and wood and paper products.

From Mexico down to Patagonia, we flew over various centers where Americans in the past century have built up investments in local bonds, and in railroads, mines, oil fields, farms, and public utilities.

Cows and calves in countless thousands covered the great unfenced plains between Montevideo and Rio Grande do Sul. On our coastal cruise northeast, it seemed we flew over meat enough to feed the world.

At Montevideo the *San Antonio,* after lying 19 days on the beach at Ecuador, had overtaken and rejoined us.

FEW PEOPLE REALIZE HOW BIG BRAZIL IS

Reunited, we hopped off from Rio Grande, near the southernmost tip of big Brazil, on a flight of more than 5,000 miles around the Atlantic coast line of this astonishing republic.

We landed at the hilly, forested island town of Florianapolis, once a famous whaling station of the South Atlantic. We got gas and flew on.

Soon the *San Francisco* fell behind. A stopped carburetor, Captain Eaker later said, threatened a bad fire. "However," continues his journal, "I took one look below at the high waves of the Atlantic and decided that I'd as soon burn as drown. So I headed for shore, some miles away.

"We did not catch fire. Waves threw us upon the beach, and about 100 natives rushed out of the bush. They got on a rope and, like a long team of horses, helped us pull the plane ashore.

"That night I slept on the ground, under the wings of the plane, so tired that giant cockroaches crawling over my hands and face didn't awaken me. My partner, Lieutenant Fairchild, had a flash light. He couldn't sleep, for an Indian fisherman kept calling him to bring his flash light and count the Indian's fish. Next day, after repairs, we got safely off and overtook the flight at Santos."

It takes a huge fleet each year to move the mountains of coffee exported from Santos. Circling over this aromatic island town, lifted from the swamps by that incredible toll the world pays to gratify its palate, we looked down on the coffee docks and imagined we could actually smell that fragrant brown berry.*

FLY OVER PALATIAL HOMES

Inland from Santos a few miles lies the truly splendid city of São Paulo, or St. Paul. Here Brazilian millionaires have built some of the most palatial private residences in the world. Railways radiate in every direction, and probably no region anywhere is richer in farm products.

On the 200-mile panoramic hop from Santos to Rio de Janeiro we flew over a coast line as beautiful as the Mediterranean shores around Nice and Monte Carlo. Here physical geography changes swiftly.

Before us now that world-famous rocky landmark called "Sugar Loaf," which guards the Bay of Rio, lifted its hard, round head. Tilting our wings and soaring around this stern geological giant, we looked down on the emerald-tinted haven.

* See, also, "A Visit to the Brazilian Coffee Country," by Robert De C. Ward, in the NATIONAL GEOGRAPHIC MAGAZINE for October, 1911.

Long evening shadows from a hundred peaks and pinnacles fell athwart its calm waters (see page 485).

The "Fingers of God," as these five fantastic peaks across the bay are called, clutched at heaven as we circled the harbor. Beyond the white city, which crowds its million and a half people between sea and mountain, still more ranges rose, steep of slope but green with verdure. Up from among the houses of Rio a 2,000-foot peak raised itself, a great rocky sliver sticking in the heart of the town, like a javelin thrown by a giant from another world.*

On our stroll through the streets of Rio we marveled at the number of coffee shops and lottery counters. Everybody seemed to be running or patronizing one. There are drawings every day, we heard, and lottery numbers form the one big subject of street chatter, in which thousands of foreign residents take part.

More to our liking was an early morning visit to the noisy, redolent municipal market. Here the fragrance of cut flowers mingled with the smell of fresh fish, and a crated pig squealing tenor made a duet with a blind man's wheezy accordion. Babel itself could have been a quiet place compared with this Rio market, where, in a confusion of many tongues, each vender sought to outscream his competitor.

Literally, anything could be had here, anything from an owl-shaped German-made alarm clock that rolled its eyes to a caged live leopard with white feathers from his poultry breakfast still clinging to his whiskers.

In our home-run flight around Latin America, Rio de Janeiro stood for third base. We felt, as we hopped off from here, that the last long leg of our trip had begun.

Though we could stop at Victoria but a few minutes to refuel, the kindly officials there set up a banquet table on the beach sands beside our planes. "You aviators need refueling, too," a Brazilian colonel said.

The last hour of our flight into Bahia was in total darkness, over rough open ocean, entirely by compass.

When we had located the harbor by its lights, we flew along the beach to let the people know we were in; then flew back and alighted far out, where there was less danger of hitting small boats or buoys, whose location we could not see. We flew close to an incoming steamer. Apparently it knew nothing of our arrival. Its astonished skipper, familiar enough with the lights on well-behaved ships, promptly reversed his engines and started to back out of the bewitched harbor when our red and green lights began to bounce before his bows.

Pernambuco was our goal next day, but darkness fell before we reached it; so we alighted at a little coastal hamlet where dugouts paddled about as we anchored. Friendly villagers fed us.

A full moon climbed up from the eastern sea, beaming a broad path across long, silent ground swells. Green palms glistened along the sandy beach, as if wet from fresh paint. Silvery waves broke about the coral reefs and a sailboat edged lazily across the peaceful picture. We slept.

LONG STRETCHES OF BRAZILIAN COAST ARE UNINHABITED

Flying the coast of Brazil, we rode hundreds of miles above a long line of coco palms that fringes the beach. Nestling among the trees here and there were huts that house the half-clad men who pick nuts.

At Pernambuco our first order to the local flight agent was for five gallons of orangeade. He looked at us in consternation, but produced the juice. We promptly drank it all! Early on our voyage we had learned to ask for *naranjada*, and it was a constant substitute for uncertain drinking water.

Before we could take off, the tide ran out from under our planes; so we had to wait till the middle of the afternoon. Then we jumped off for Natal.

We felt that one of the ways to encourage commercial aviation was to announce a schedule and then stick to it. We did our best to come and go on time. When we left Rio it was known we planned to fly the 3,000 miles to Pará in four days. This meant taking chances on rain and storms and using up much time

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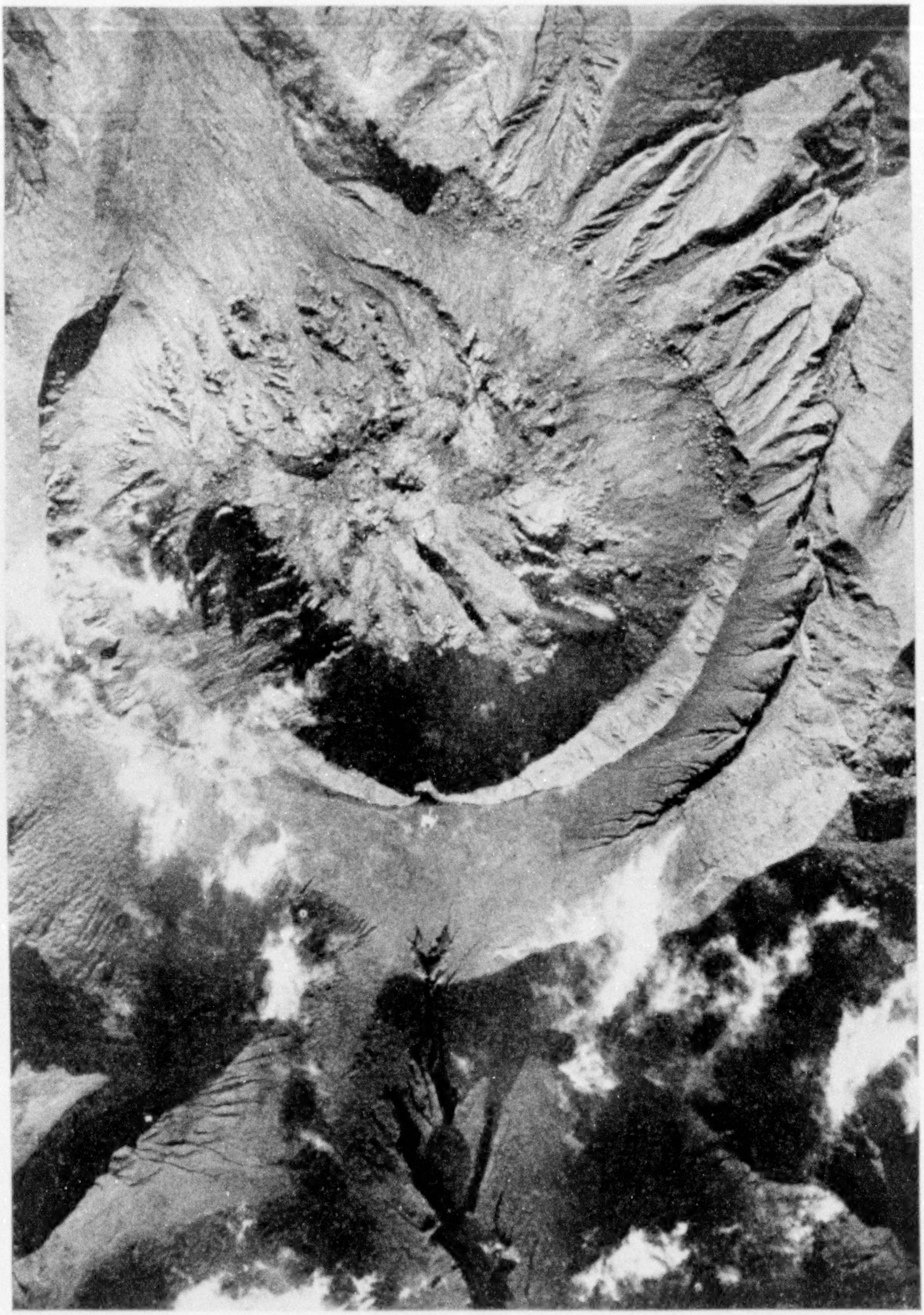
* See, also, "Rio de Janeiro, in the Land of the Lure," by Harriet Chalmers Adams, in the NATIONAL GEOGRAPHIC MAGAZINE for September, 1920.



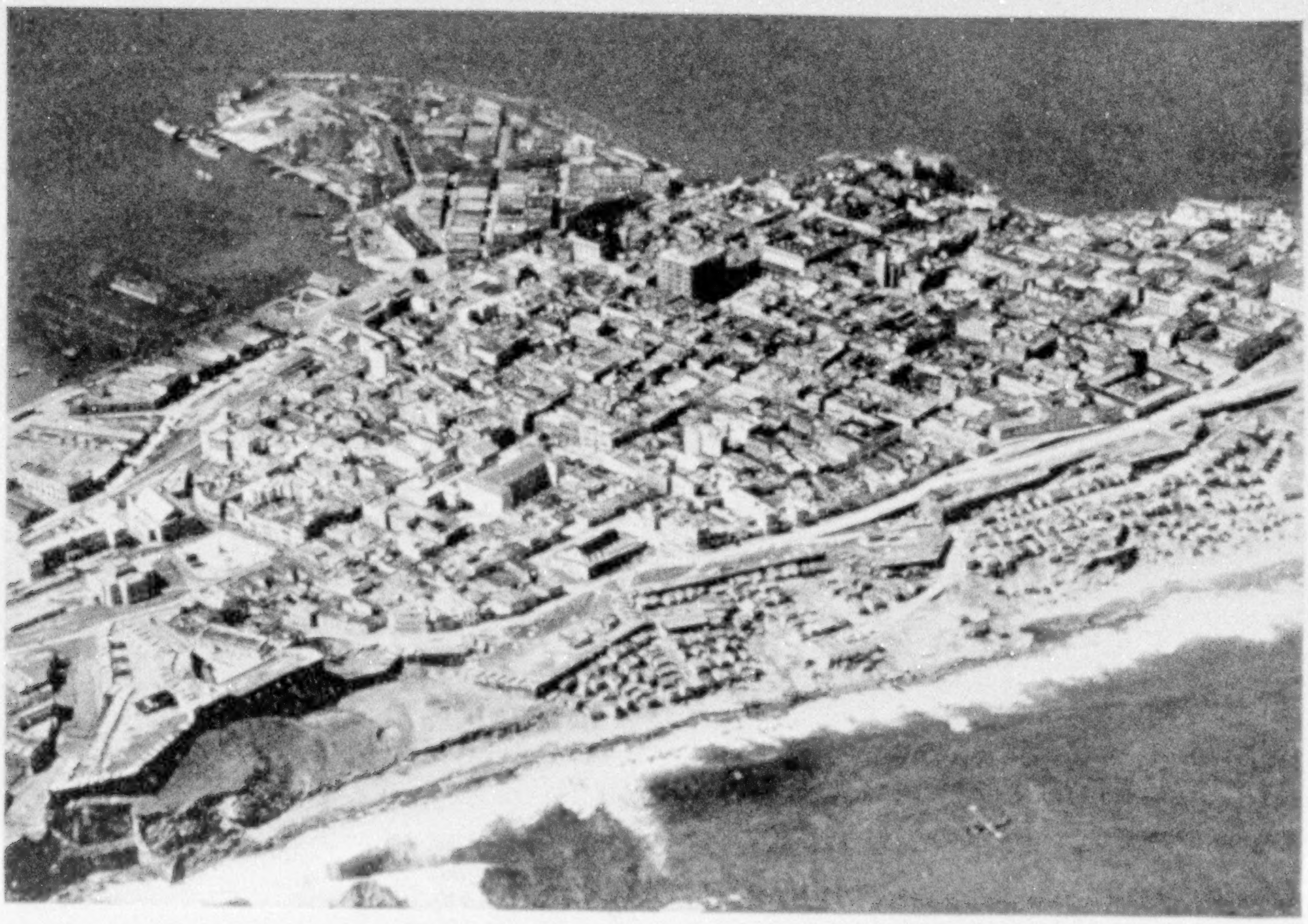
© Compagnie Aérienne Française

THIS WOUND IN THE WORLD IS THE CRATER OF MONT PELÉE

When this volcano on Martinique Island erupted in 1902, it overwhelmed the town of St. Pierre, with its 40,000 people. An airplane photograph, taken at 4,000 feet above the crater, indicates the width of the lava streams, now hardened, which made its eruption one of the major volcanic disasters of history.

Photograph by Gilbert Grosvenor

THE HISTORY OF MORRO CASTLE, AT THE ENTRANCE TO HAVANA HARBOR, IS THE HISTORY OF CUBA



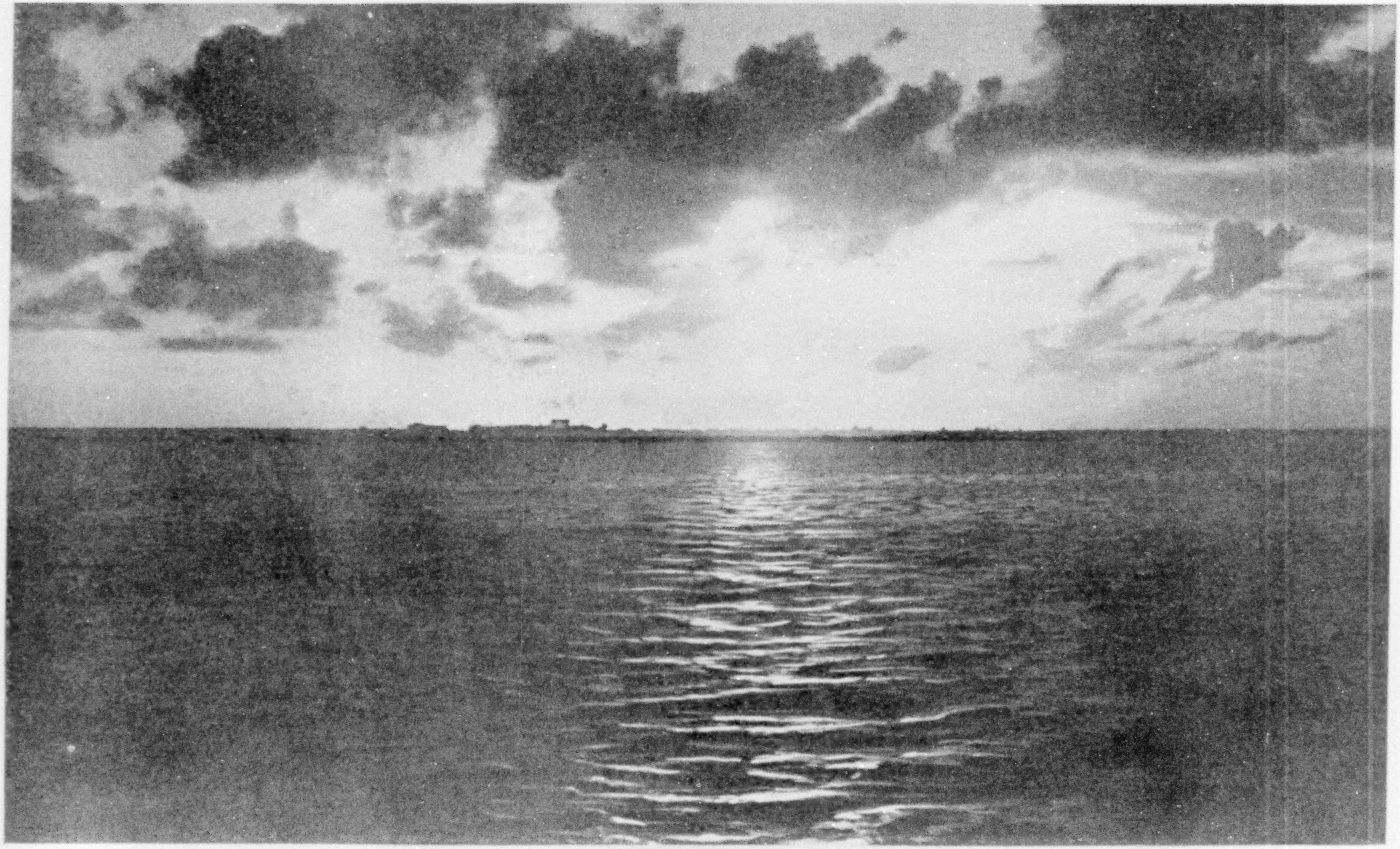
Official Photograph, U. S. Army Air Corps

SAN JUAN ON PORTO RICO, AN ISLAND WHERE AMERICAN ADMINISTRATION HAS BROUGHT AMAZING PROSPERITY

Photograph by Manuel Ferber

OFFICIAL CUBA HAILS FLYERS ON LAST HOMEWARD HOP

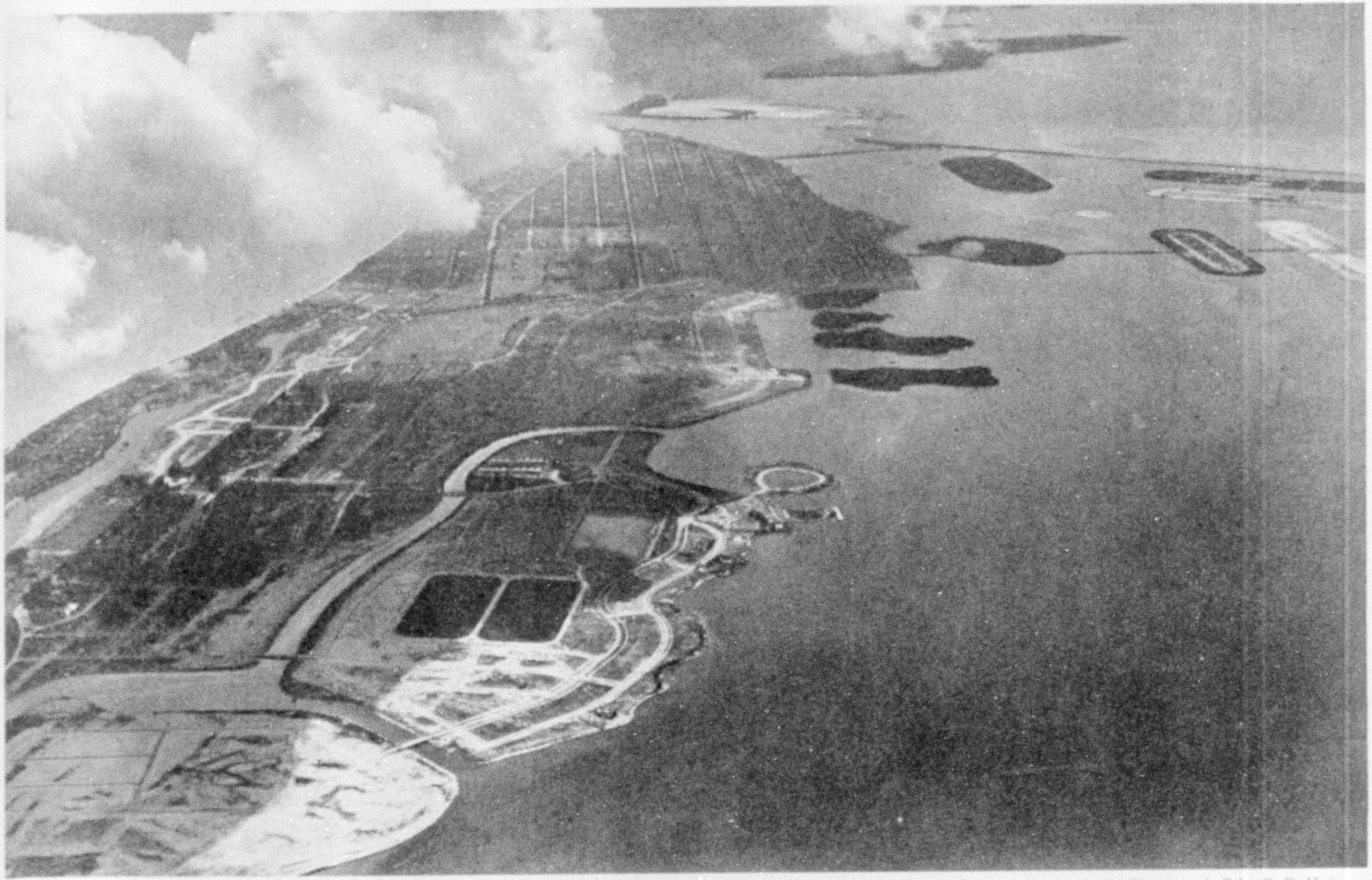
This ceremony was typical of the hospitality extended the flyers in every country they visited. The Mayor of Santiago de Cuba is presenting the historic gold medal worn by his predecessors when Cuba was under the Spanish régime.



Photograph by John Oliver LaGorce

SUNSET IN MIAMI-LAND

The air-weary flyers, on the last leg of their 22,000-mile mission of *friendship*, were welcomed by the citizens of Miami with open arms. Again their homeland was about them.



Photograph © by R. B. Hoit

MIAMI BEACH FROM THE AIR

The placid waters of Biscayne Bay, which separate Miami, the metropolis of southern Florida, from beautiful Miami Beach, offer a natural harbor for seagoing aircraft. Here the returning Good Will Flyers made their first landing in the United States en route to Washington. Biscayne Bay, dotted with man-made islands, on the right, and the ocean beaches, laved by the Gulf Stream, below the cloud bank to the left.

Official Photograph, U. S. Army Air Corps

AFTER CIRCUMNAVIGATING A CONTINENT THE PAN AMERICAN GOOD WILL FLYERS REACH WASHINGTON

Ending their 22,055-mile flight at Bolling Field, Washington, Major Dargue and his companions delivered to President Coolidge the messages sent him by the Latin American countries visited. From the President the aviators received the Flying Cross, and are seen holding the official citations.

at official receptions. But the end of the third day found us at Natal, with 1,200 miles to go the next day!

And what a country! An infinity of oozy, sluggish flats, apparently as empty now of human life as when giant things, half beast and half lizard, wallowed in oceans of mud while the world was young.

"This coast is little known" was the warning written on our maps, which vaguely showed the shore with a few uncertain dotted lines.

Till we got there and saw this dreary, empty expanse, we could not understand why a country as rich and old as Brazil had not properly mapped its coast lines. But, actually, no honest cartographer could do that job intelligently. For hundreds and hundreds of miles that wild region is a flat, watery waste, with mangroves growing far out to sea at high tide and far inland at low tide, for here the tide is 21 feet. When it rises, the coast line moves back into the jungles; when it falls, the coast line moves out to sea.

The only living things we saw, besides an occasional crocodile, were flocks of red flamingoes flying over the jungle. For hundreds of miles we saw not a single hut, not even a native canoe; nor did we see any signs of sails out at sea. It was an empty, forgotten world.

Twelve hours of flying put us over the Amazon Valley, where dense forests crowd up against the city of Pará. This is the entrepôt of the great valley. Thence river boats ply as far upstream as the Peruvian frontier. We wanted to explore this great river, but our schedule drove us on (see page 484).*

In a 500-mile hop across the many jungle mouths of the muddy Amazon, we jumped to Cayenne, French Guiana. A hospitable night there, and then away early for Paramaribo, capital of Dutch Guiana. Here at least 3,000 people, on bicycles, followed us down the quaint streets of this bit of Old Holland. Then up and off for Georgetown, in British Guiana.

Trees hid flat, low-lying Georgetown a bit, as we neared it. Protecting it from high seas is a large stone wall, the favorite promenade in the cool of the evening. Here our British friends introduced to us the "swizzle stick," an implement of fancy design used with some violence in making mixed drinks. One they swizzled for us was called "pepper punch"; it was nonintoxicating, but after one scorching swallow we decided that temperance is not without its terrors.

FROM CONTINENT TO CONTINENT, OVER A BRIDGE OF ISLANDS

Uninhabited jungle fringed the mouth of the Orinoco, as we saw it next day on our way to Trinidad. With the exception of Jamaica, this is the largest of the British West Indian islands. Probably it was once attached to the mainland of Venezuela.

Much of the asphalt in the streets of American cities comes from the singular Pitch Lake on Trinidad.

A side flight to Caracas, capital of Venezuela, was planned when we hopped from Trinidad; but, because of heavy clouds and bad landing facilities, we flew to Puerto Cabello. Here Weddington and Whitehead, who had left us at Buenos Aires to get a new plane in Panama, came down the coast and met us. We all went by motor car to call on the President of Venezuela at Caracas.

Rough weather made it impossible to rise from the sea, as we sought to leave; so we ran the planes out on the beach, hired natives to chop down a clear runway through the woods, and took off by land. Returning via Trinidad, we jumped like frogs from island to island across the Leeward and Windward groups, visiting Granada, St. Vincent, Martinique, Guadeloupe, and the Virgins. Some of these flights were, for a hundred miles or so, out of sight of land.

From the Virgins we jumped to Porto Rico and the Dominican Republic. Thence to Cuba, over Havana and Morro Castle—homeward bound.

Nearing Key West my partner scribbled a note: "We have jumped the last hurdle in the Pan American flight."

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* See, also, in the NATIONAL GEOGRAPHIC MAGAZINE for April, 1926, "The Amazon, Father of Waters," by W. L. Schurz; and "Exploring the Valley of the Amazon in a Hydroplane," by Capt. Albert W. Stevens.

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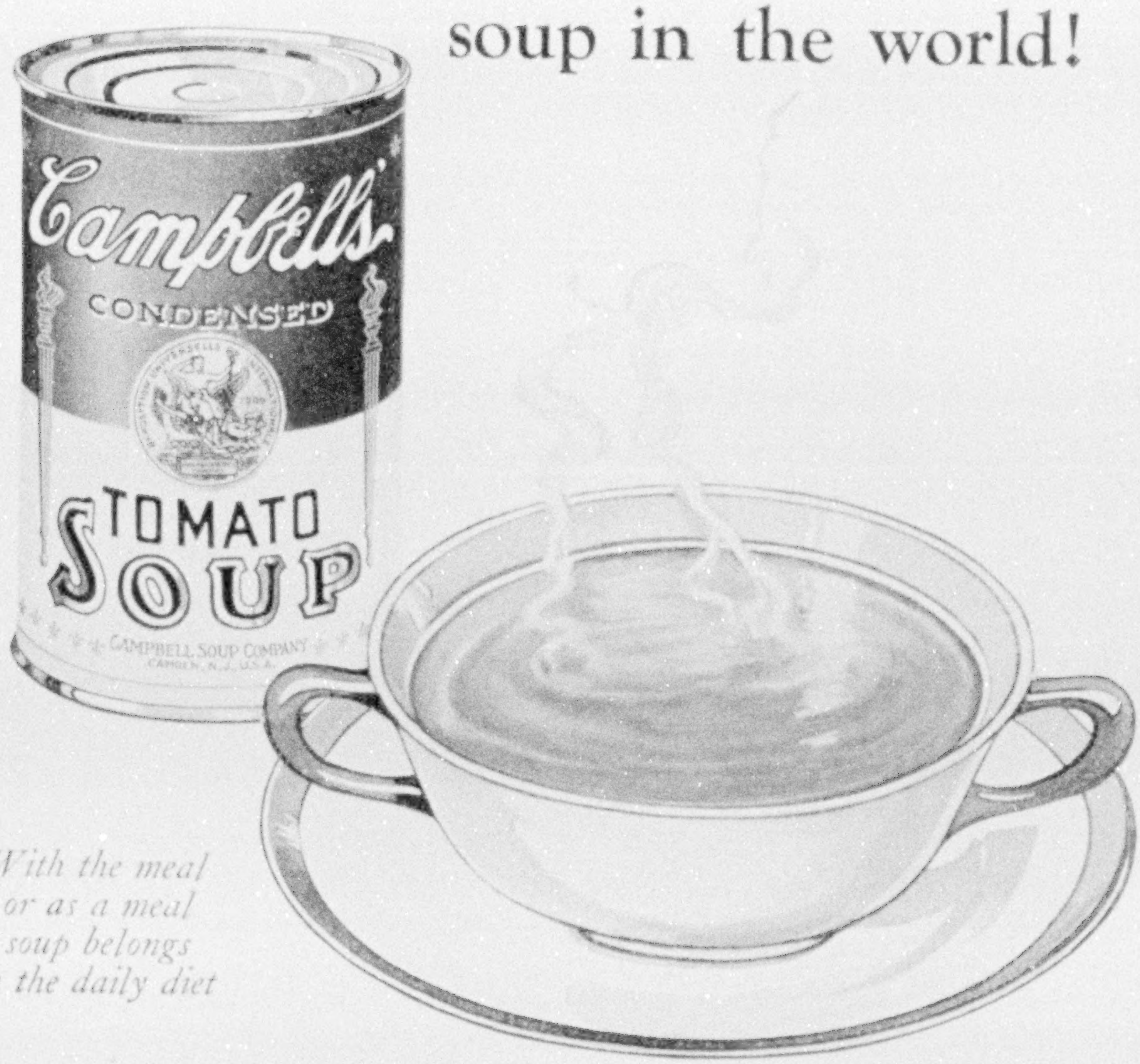
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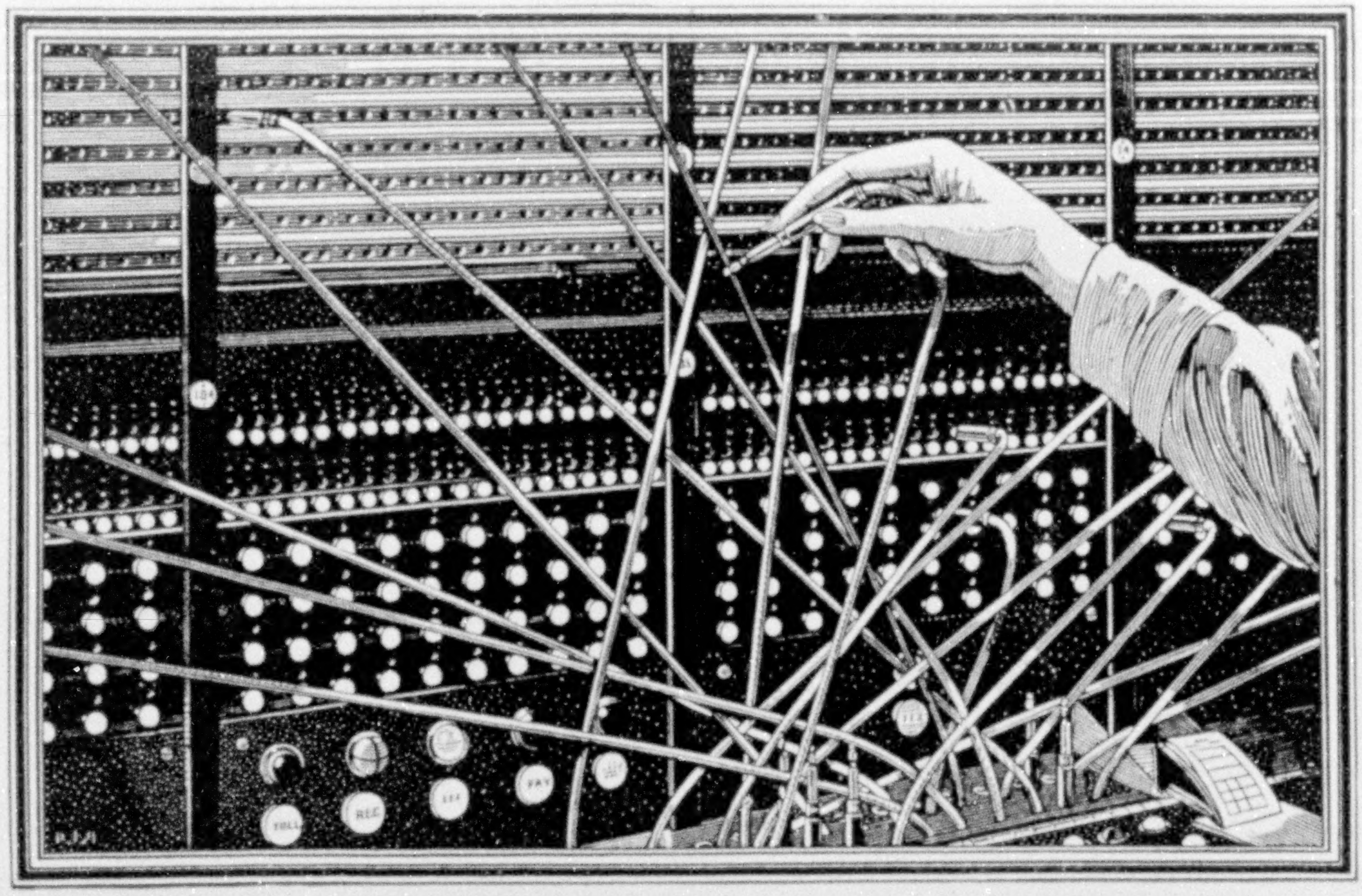

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27

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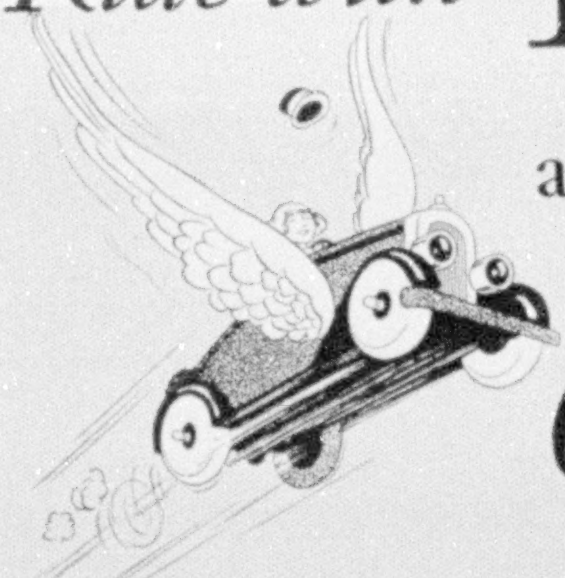

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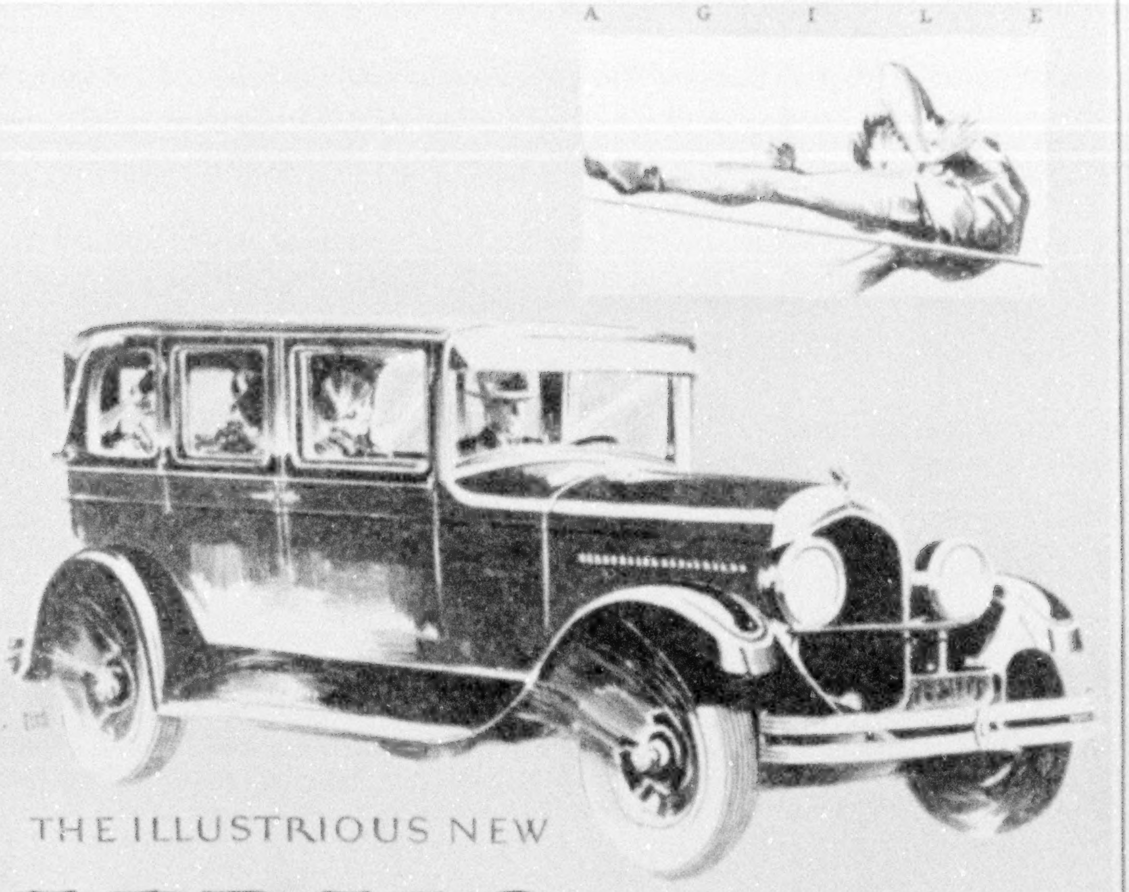

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$15,00000 *in cash prizes for a slogan about* WOOD

Read the fascinating story of Nature's most friendly and useful material. Know more about its beauty, durability and economy. Learn the truth about America's vast and permanent supply of timber. Then send us your slogan!

This message may mean $5,000 to you. And remember that these slogan contest prizes are seldom won by professional writers or technical experts. Nearly always the winners are people who never expected to win. So do not skip anything—not one word.

No timber shortage

Almost everyone has been induced to believe that this country is confronted by an acute shortage of timber. This is not true.

In fact, Col. William B. Greeley, U. S. Forester, urges the nation to "Use wood and conserve the forests." For timber is a *crop.* It needs to be cut when ripe. Failure to do so means *waste.*

There is enough standing timber in the United States today to build a new six-room house for every family in this country, Canada, South America, all of Europe and the entire British Empire! And the *additional* lumber supplied by the *yearly growth* of standing trees would build a continuous row of these houses along both sides of a street reaching from New York to San Francisco.

These are not "opinions" but *facts* backed up by extensive investigations and published reports of the United States Forest Service.

Better lumber than ever

Not only plenty of lumber—but *better* lumber! Today, *American Lumber Standards,* adopted by the industry and endorsed by the U. S. Government, give the purchaser protection he never had before.

Universal adoption of reliable standards has won for the Lumber Industry high praise from Secretary of Commerce Herbert Hoover.

Wood built America

Without wood there could have been no America!

Stout wooden ships brought the settlers of America across the wide stretches of the stormy Atlantic. Wood sheltered them in sturdy log cabins and wood housed their descendants in colonial mansions—many of which endure today.

Throughout the Thirteen Colonies wood built the homes, the churches, the town halls, the schools. Wood built the wharves, the warehouses, the stockades, the barns, the corn cribs, the bridges.

Later, the Forty-Niners battled their way over the long cruel trail to California in covered wagons made of wood. On ties of wood the railroads advanced unceasingly, West, East, North and South.

Uses constantly increasing

Twenty years ago there were less than 2600 commercial and industrial uses for wood. Today there are more than 4500.

From the staunch timbers in mine shafts to the buoyant strength of Lindbergh's immortal plane, wood serves mankind in countless and ever-increasing ways.

Wood endures

The oldest and most beautiful homes in America are houses built of wood. Many of them stand today, as sound in timber and beam, and *as liveable,* as they were before the Revolution.

Wood endures—and the supply is enduring. It is the only one of our natural resources that *grows.* The mine becomes a gaping hole, the forest forever *renews.*

Wood is beautiful

Wood possesses a pleasing natural beauty of grain and texture that mellows and deepens with age and defies imitation. Wood can be fashioned and carved and fitted into thousands of charming designs.

And surely it is significant that the American architect prefers lumber for his own home!

Wood is friendly

Of all materials there is none so *friendly,* with such a sense of human companionship as wood. Wood is warm and alive to the touch. The handle of a tool, the steering wheel of your car, the arm of your chair, the bowl of your pipe—you like the feel of them because they are wood.

Wood is economical

Wood is stronger, pound for pound, than any other material. It is easily and cheaply fitted to special forms for special needs. Its moderate cost is due today, in no small measure, to the elimination of waste. There is a grade of lumber for every purpose, a right wood for every need.

* * *

To inspire renewed and greater appreciation of wood, and to make more widely known its almost endless variety of uses, manufacturers of American Standard Lumber in the National Lumber Manufacturers Association are preparing an extensive educational campaign. The first thing the Association wants is a "slogan." Send your coupon *now!*

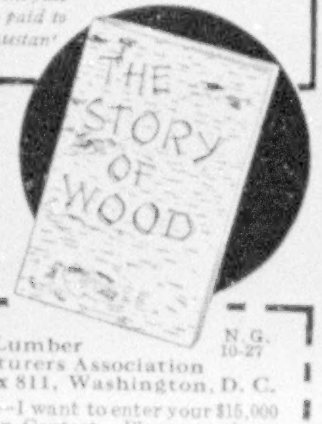
NATIONAL LUMBER
MANUFACTURERS ASSOCIATION
Washington, D. C.
Manufacturers of American Standard Lumber

This free booklet may mean $5,00000 *to you*

Send today! Mail coupon below and booklet will be sent you postpaid. It contains the *Official Blank on Which Your Slogan Must Be Submitted.* This may mean $5,000.00 added to your bank account So mail your coupon right now.

First Prize	$5,000
Second Prize . . .	2,000
Third Prize . . .	1,000
Four Prizes (each) .	500
Fifty Prizes (each) .	100

In case of tie the full prize will be paid to each tying contestant



N. G.
10-27

National Lumber
Manufacturers Association
P. O. Box 811, Washington, D. C.

Gentlemen:—I want to enter your $15,000 Prize Slogan Contest. Please send me free copy of your booklet, "The Story of Wood," so that I may qualify.

Name ....

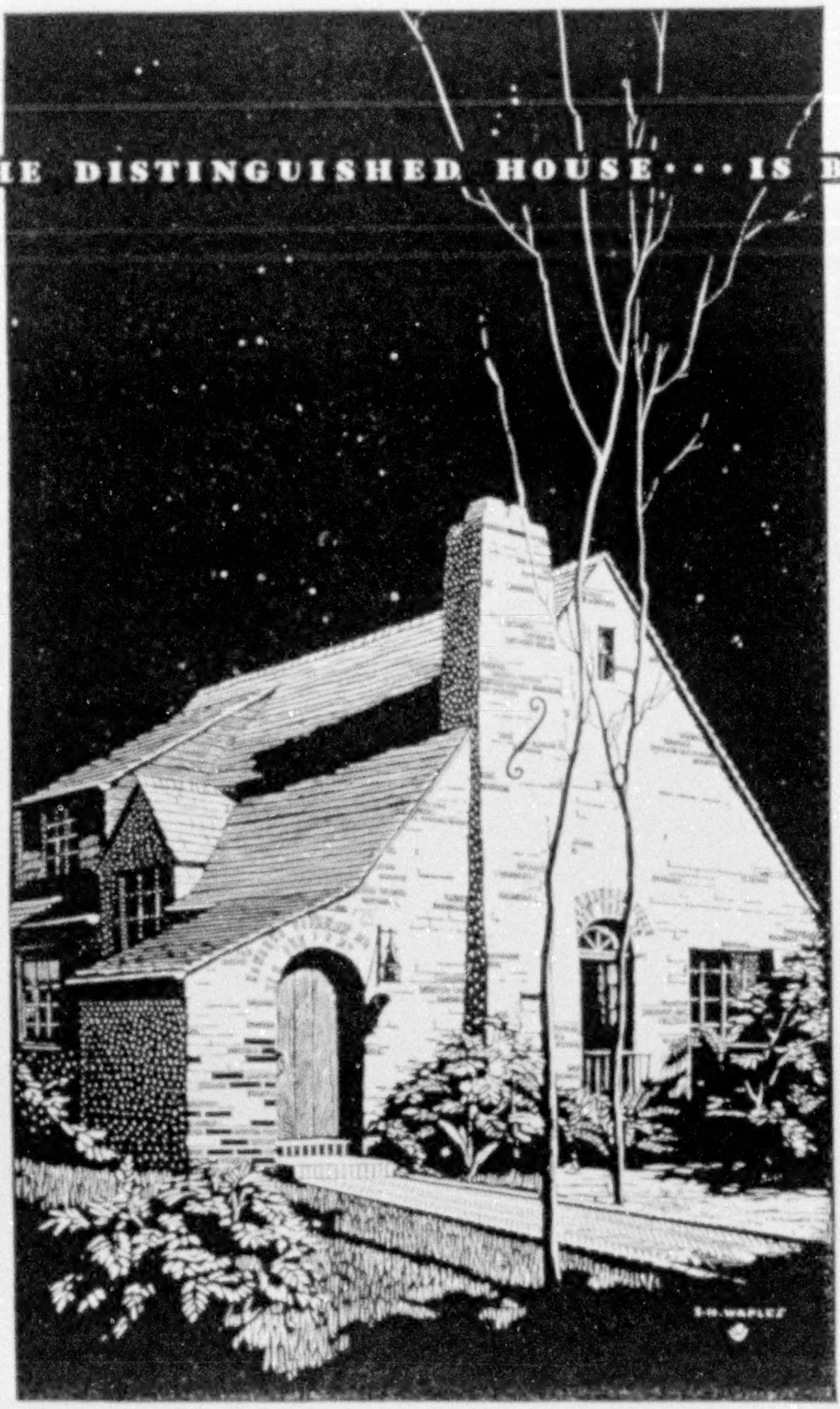
Street ....

R. F. D., Town or City ....

State ....

Face Brick
made by a Member of the
AMERICAN FACE BRICK
ASSOCIATION

THE DISTINGUISHED HOUSE . . . IS BUILT OF FACE BRICK



BEFORE you buy or build a house ask yourself these questions. Will its design, treatment and the material used in its construction be as popular in ten years as it is now? Will your house be as salable?

These are important considerations in your decision. Unusual designs and daring wall effects may be a transitory public fancy—and, therefore, a speculative investment. The house that is conservative in design and treatment and substantial in construction is always the soundest investment.

All the colors, all the textures and all the artistic effects which may be employed with safety may be had in face brick. And in buying or building a face brick house you have the security offered by the *permanency* of face brick.

Conservative and honest builders who build houses to sell are building of face brick. It will pay you to seek such a builder. Or if you expect to build your own house you will be interested in learning why it is real economy to use face brick. You will find the booklets listed below both interesting and helpful to you.

AMERICAN FACE BRICK
ASSOCIATION
1737 Peoples Life Building
Chicago, Illinois

Rich in colors, distinctive in textures and endowed with endurance that defies time, face brick possesses that rare beauty which never grows old. The house built of face brick becomes lovelier with the passing years and always says "worth-while folks live here."

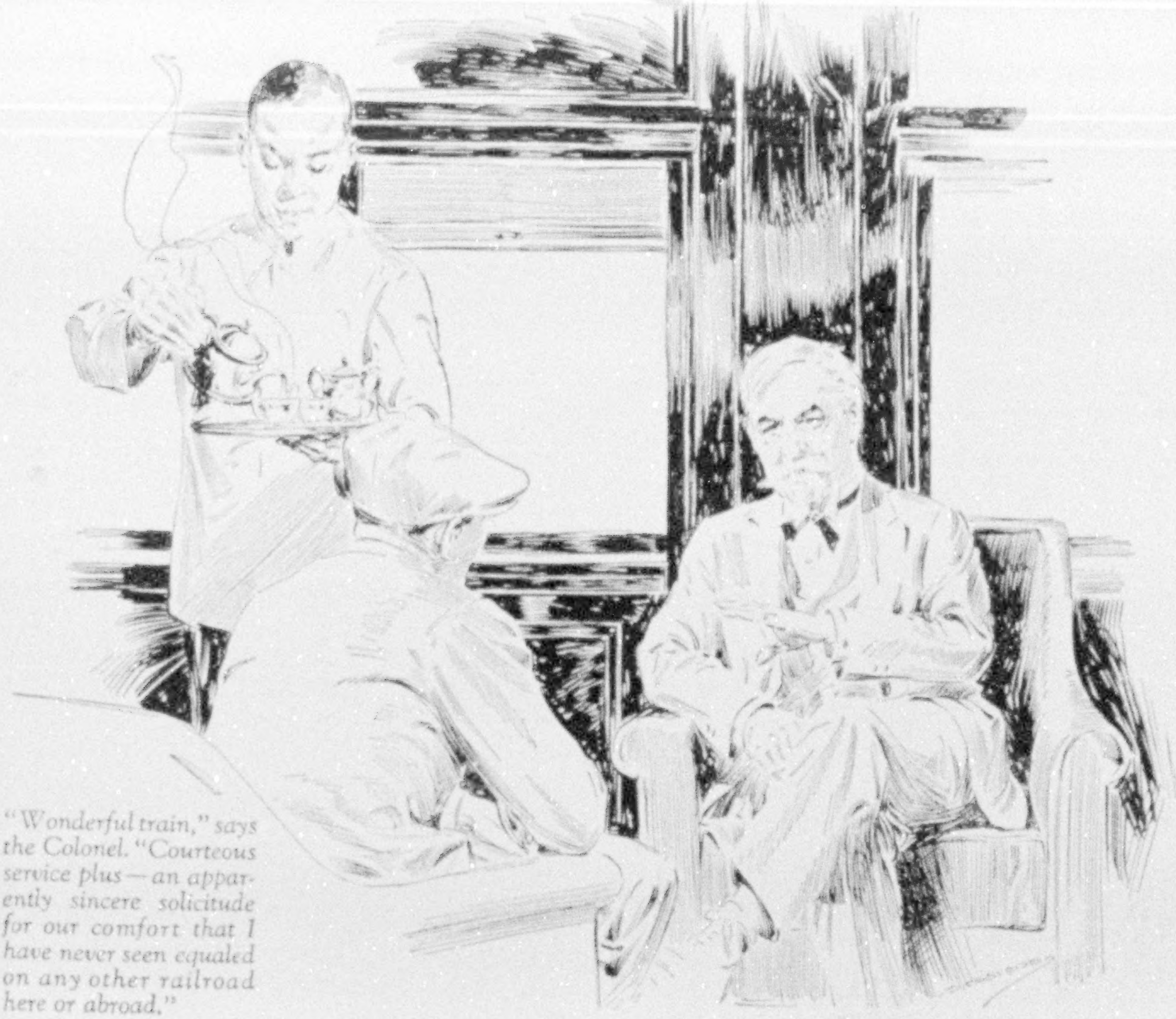
FACE BRICK

"The Story of Brick"—a beautifully illustrated booklet for the home-buyer and home-builder. Sent free.

"A New House for the Old"—an interesting book on remodeling. Sent free.

"The Home of Beauty"—containing 50 two-story, six-room houses, in a wide variety of designs. Sent for 50 cents.

"Face Brick Bungalow and Small House Plans"—Four booklets showing designs and floor plans for inexpensive 3 to 4-room, 5-room, 6-room and 7 to 8-room houses. Each 25 cents. Complete set, $1.00.



"Wonderful train," says the Colonel. "Courteous service plus—an apparently sincere solicitude for our comfort that I have never seen equaled on any other railroad here or abroad."

Experienced travelers are quick to appreciate the congenial atmosphere and many unexpected courtesies that distinguish the Rock Island's

Golden State Limited

De Luxe Train to California

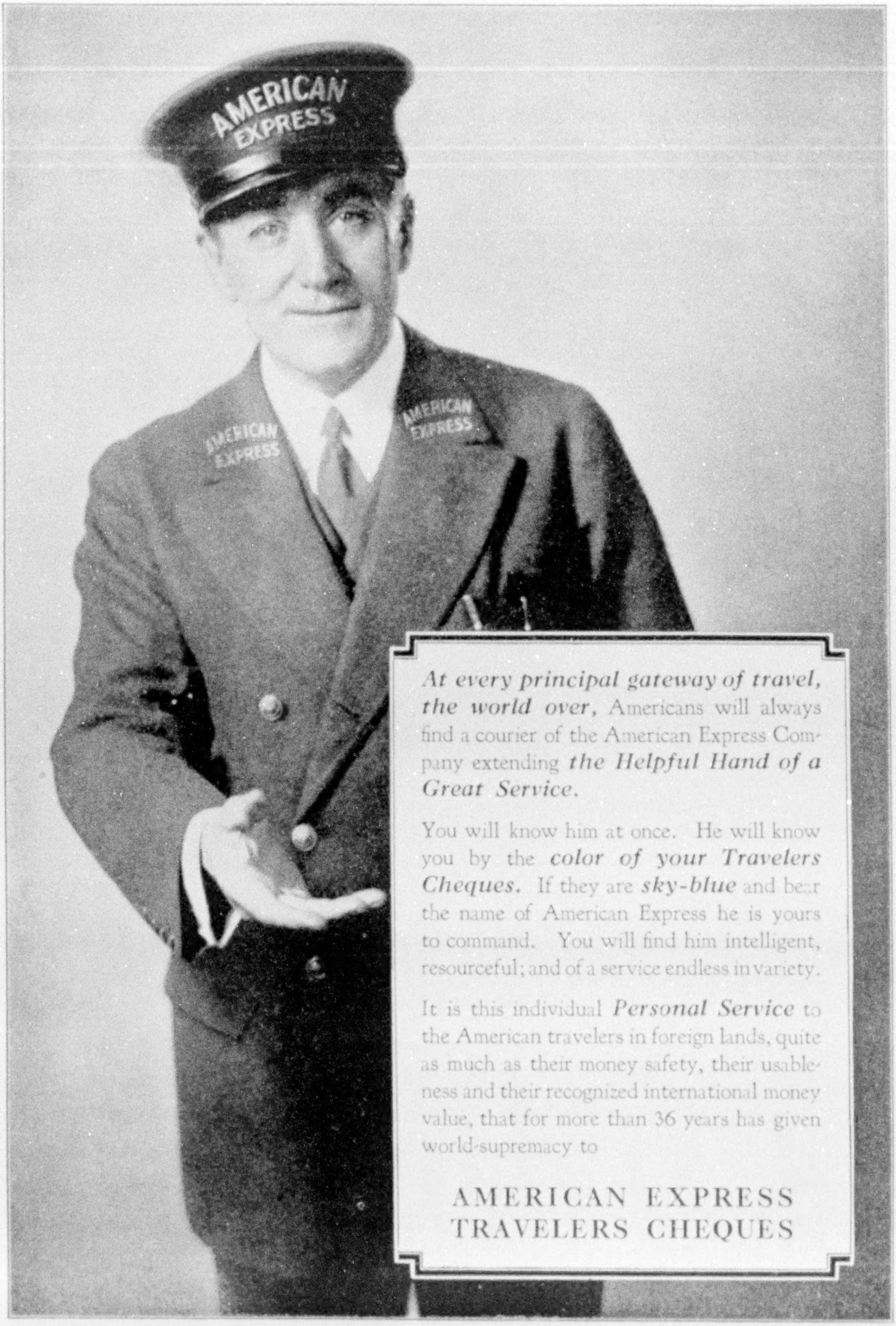
Route of surpassing interest—direct—low altitude. There is no shorter line—no quicker time.

Rock Island-Southern Pacific service includes also the *Apache*—same popular low altitude route.

Rock Island Lines

The Road of Unusual Service

ROCK ISLAND TRAVEL SERVICE BUREAU, LA SALLE STREET STATION, CHICAGO, ILL.
Please send booklets descriptive of California and the Golden State Limited.
Name__________________ Address__________________ o



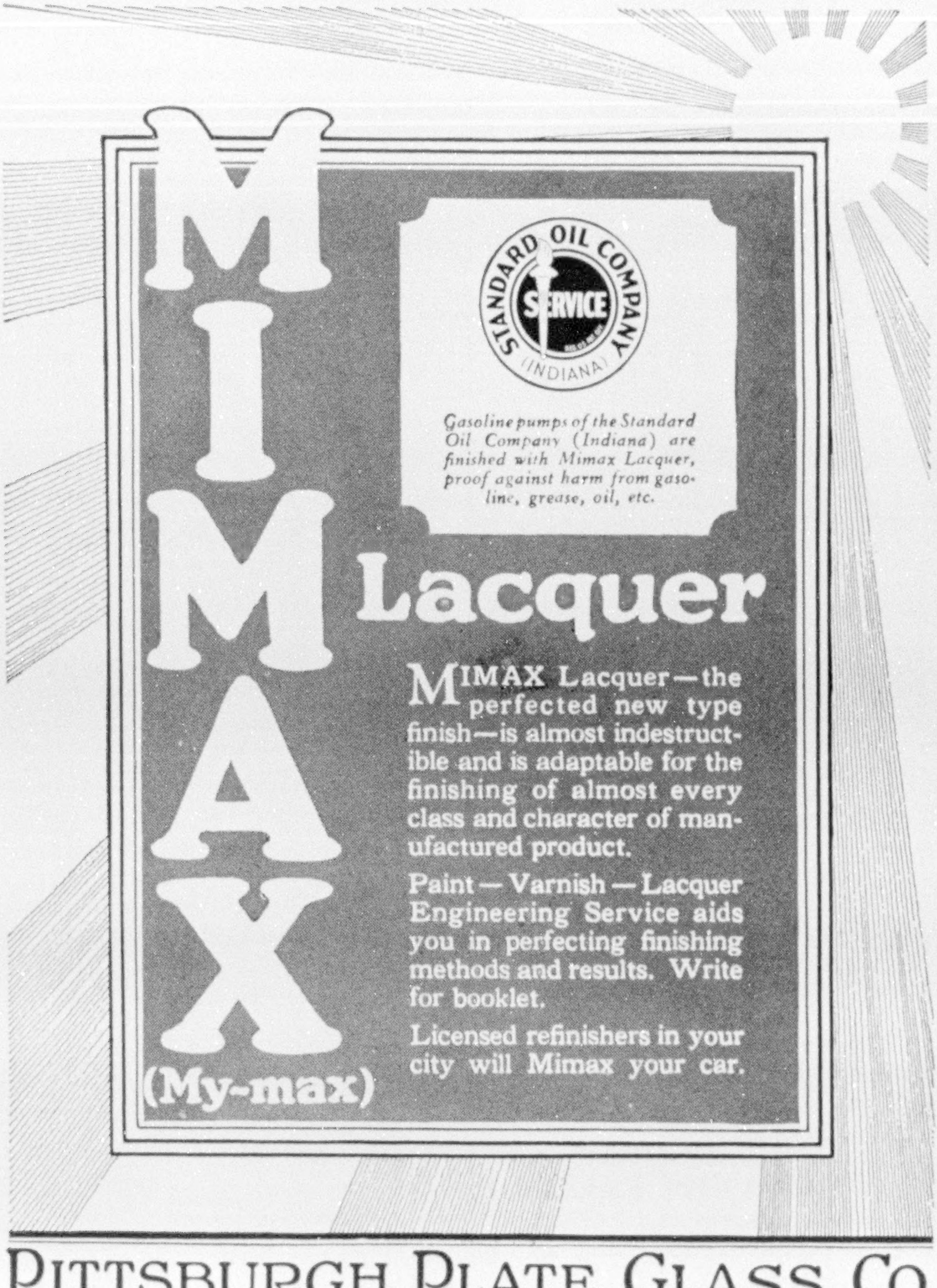
At every principal gateway of travel, the world over, Americans will always find a courier of the American Express Company extending ***the Helpful Hand of a Great Service.***

You will know him at once. He will know you by the ***color of your Travelers Cheques.*** If they are ***sky-blue*** and bear the name of American Express he is yours to command. You will find him intelligent, resourceful; and of a service endless in variety.

It is this individual ***Personal Service*** to the American travelers in foreign lands, quite as much as their money safety, their usableness and their recognized international money value, that for more than 36 years has given world-supremacy to

AMERICAN EXPRESS
TRAVELERS CHEQUES

American Express Travelers Cheques are for sale by 22,000 Banks, American Express, and American Railway Express Offices


STANDARD OIL COMPANY
SERVICE
(INDIANA)
PITTSBURGH Proof Products
Glass-Paint-Varnish-Brushes

Gasoline pumps of the Standard Oil Company (Indiana) are finished with Mimax Lacquer, proof against harm from gasoline, grease, oil, etc.

MIMAX Lacquer

(My-max)

MIMAX Lacquer—the perfected new type finish—is almost indestructible and is adaptable for the finishing of almost every class and character of manufactured product.

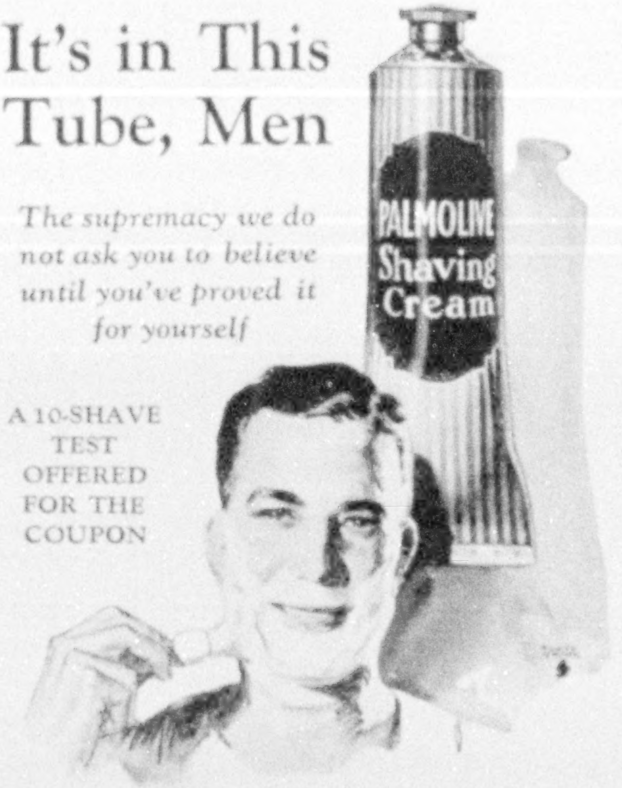
Paint—Varnish—Lacquer Engineering Service aids you in perfecting finishing methods and results. Write for booklet.

Licensed refinishers in your city will Mimax your car.

PITTSBURGH PLATE GLASS CO.

Paint, Varnish and Lacquer Factories, Milwaukee, Wis. Newark, N. J., Portland, Ore., Los Angeles, Cal.

It's in This Tube, Men



The supremacy we do not ask you to believe until you've proved it for yourself

A 10-SHAVE TEST OFFERED FOR THE COUPON

GENTLEMEN:

Ask your druggist, and he will probably tell you Palmolive Shaving Cream is his fastest seller.

Sixty years of soap study stand behind it. 130 formulas were tried before we succeeded in this unique creation. 1000 men had told us what they sought—5 things a shaving cream should accomplish. They set our goal.

Test these 5 improvements

1. Multiplies itself in lather 250 times.
2. Softens the beard in one minute.
3. Maintains its creamy fullness for 10 minutes on the face.
4. Strong bubbles hold the hairs erect for cutting.
5. Fine after-effects due to palm and olive oil content.

Now we offer you a free test. Shave 10 times and *learn* why men adopt it. *Words* can't win men to quit their former shaving cream for this.

Make this test yourself. Cut out the coupon to remind you.

THE PALMOLIVE-PEET COMPANY
CHICAGO, ILL.

3731

10 SHAVES FREE

and a can of Palmolive After Shaving Talc

Simply insert your name and address and mail to Dept. B-1405, Palmolive, 3702 Iron Street, Chicago, Ill. Residents of Wisconsin should address Palmolive, Milwaukee, Wis.

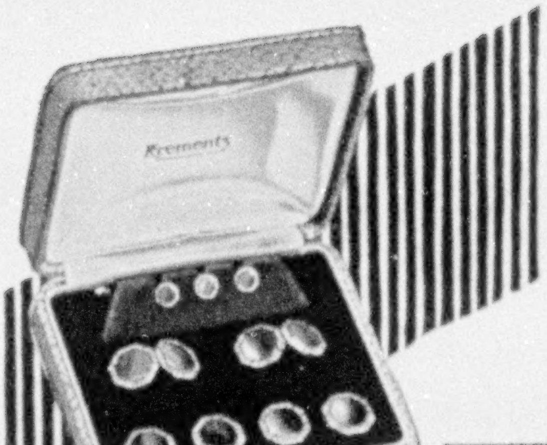
(Please print your name and address)

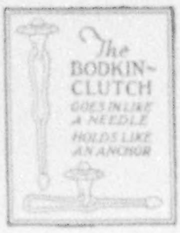
Evening Jewelry for the Well-Dressed Man

AT affairs where correct attire is an inflexible requirement, there is a noticeable preference for Krementz Evening Jewelry. An appearance of quality and refinement is ever present in dress sets by Krementz. The bodkin-clutch back, on all Krementz studs and vest buttons, has made the erstwhile troublesome task of inserting shirt studs a matter of ease. Each set handsomely cased—wonderful for gifts.

Write for illustrations of designs and copy of Correct Dress Chart.

KREMENTZ & CO.
Newark, N. J.





No. 2433—3 studs with bodkin-clutch backs; pair links; 4 waistcoat buttons with bodkin-clutch backs $17.50
Others $8.50 to $50

Krementz
Gift Jewelry for Men

Cruising the Seven Seas

Your Winter Vacation Voyage

22 to 133 days Rates from $12 per day

To the Mediterranean

Does your fancy call you to sophisticated Europe's playground at Monte Carlo, to the Valley of the Kings in Egypt, to hallowed Palestine, to historic Greece? These are only part of what you see on our Mediterranean cruises of the famous *S. S. Adriatic* and the new *S. S. Laurentic.*

* * * *

By White Star liners—*Adriatic* sailing Jan. 7, Feb. 25; new 19,000-ton *Laurentic*, Jan. 17, Mar. 6. Each cruise 46 days. Stopovers from ship to ship arranged.

Apply to White Star Line

Around the World

Have you dreamed of the sublime Taj Mahal? Have you longed to see it in its marble glory, bathed in Indian moonlight? Do Hawaii, Japan and the inscrutable Orient beckon to you? Then sail round the world on the *Belgenland*. She is the largest and finest liner ever to circle the globe.

* * * *

S. S. Belgenland sailing westward from New York Dec. 14 to 65 cities in 16 countries for 133 days.

Around Africa

via So. America and Egypt

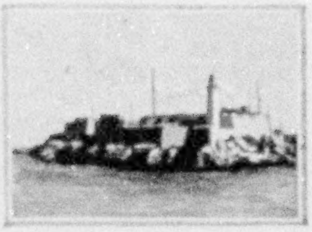
Do you thrill to the strange wild life of Africa, the Zulus, the boundless veldt, gigantic Victoria Falls? Then see this great continent—and South America, Egypt and Europe as well—on the Southern Continents Cruise of the *Lapland*, the only tour of its kind backed by experience.

* * * *

S. S. Lapland sailing from New York Jan. 16. The largest ship making this tour. Duration 101 days.

These cruises operated by the Red Star Line in conjunction with the American Express Co. For complete information apply to Red Star Line, No. 1 Broadway; American Express Co., 65 Broadway, New York; or other offices or agencies of either company.

To the West Indies



Perhaps the spirit demands a change of environment, but time is limited. Then our 22-day cruises to the West Indies are made to order for you. There's a wealth of colorful beauty, of invigorating sunshine in these short but delightful voyages below the Southern Cross.

* * * *

By White Star liner *Calgaric* (ex *Orca*) sailing Feb. 4 and Mar. 3 to Havana, Panama Canal, northern coast of So. America and the interest centers of the Caribbean.

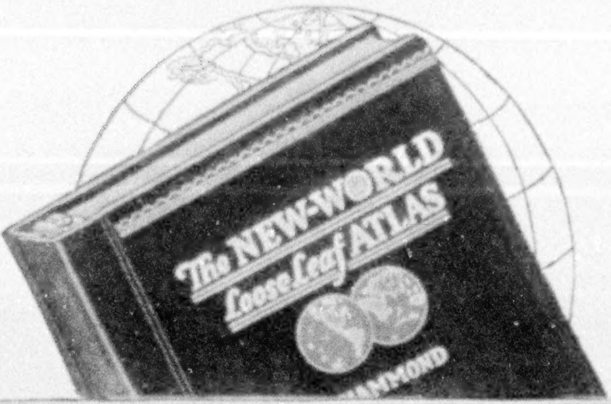
Apply to White Star Line

IMM

WHITE STAR LINE • RED STAR LINE

INTERNATIONAL MERCANTILE MARINE COMPANY

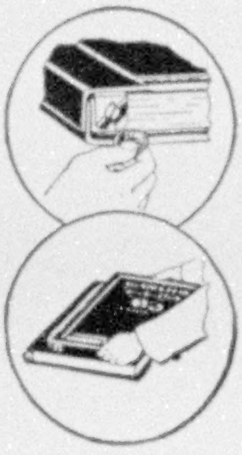
No. 1 Broadway, New York City, our offices elsewhere or any authorized steamship agent.



The Atlas that can *NEVER* grow old

Why? Because it is revised every six months. New maps are furnished the Atlas owner who very easily inserts the maps in the loose leaf binder in place of those which have become out of date. Once you purchase this Atlas, therefore, you need never buy another.

A Wealth of Vital Information



The Atlas contains almost 400 of the finest maps made in America—each 14 x 20 inches. Every corner of the world is covered by large scale plates, so detailed that the smallest topographical feature and practically every place are indicated. Over 200,000 index references are included.

Physical and economic maps show relief, rainfall, temperature, vegetation, products, density of population, etc. Historical maps trace history from ancient times to the present.

HAMMOND'S NEW WORLD Loose Leaf ATLAS

Used in Bell Telephone Laboratories, Radio Corporation of America; at Yale, Harvard, Columbia; by Thomas A. Edison, Owen D. Young, Mrs. Carrie Chapman Catt—wherever information must be authentic, recent, dependable.

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Fill in and send the coupon and you will receive without obligation sample maps from this, America's greatest world Atlas, full details about its contents and the Correction Sheet Service, together with information about the easy terms of payment.

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Gentlemen: Send me, without obligation, sample maps from "The New World Loose Leaf Atlas", information about your "Correction Sheet Service", and the convenient terms of payment.

Name ....

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Flower-scented breezes—
Languorous charm—
Seductive native music and song—

You can't begin to appreciate that South Seas fascination until you've actually been to—

Hawaii

Odd customs . . . beautiful scenery . . . and a climate like no other in the world!

For diversion—sports that stir your blood! Golf, tennis, hiking, horseback riding, swimming in warmly tempered waters and surf board races at express speed on the crests of giant waves!

There are a hundred things to do and see in this playground of the Pacific, as well as ideal conditions for restful relaxation. Book your passage now over the popular Southern Route and spend Autumn in Hawaii! *Sailings 3 Saturdays out of 4.*

DIRECT FROM LOS ANGELES TO HONOLULU

S. S. CITY OF LOS ANGELES

"Queen of the Pacific"

S. S. CITY OF HONOLULU

Newest addition to the LASSCO fleet of Luxury Liners

S. S. CALAWAII

Most popular cabin liner on the Pacific

ALL-INCLUSIVE TOURS
$278.50 and up

—covering every necessary ship and shore expense depending on steamship and hotel accommodations selected. Also, SPECIAL TOURS PERSONALLY CONDUCTED by a company representative on certain autumn sailings of the luxury liners "City of Los Angeles" and "City of Honolulu"—$323.50 and up. Send for special tour folder.

Both tours take three weeks Los Angeles to Hawaii and return, including the 3-day wonder trip from Honolulu to Hilo and Kilauea volcano.

Hawaii is a part of the great Pacific Coast Empire . . . Come and enjoy it all!

For all information apply to any authorized agent, or

LOS ANGELES STEAMSHIP CO.

730 S. Broadway, Los Angeles
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140 S. Dearborn, Chicago
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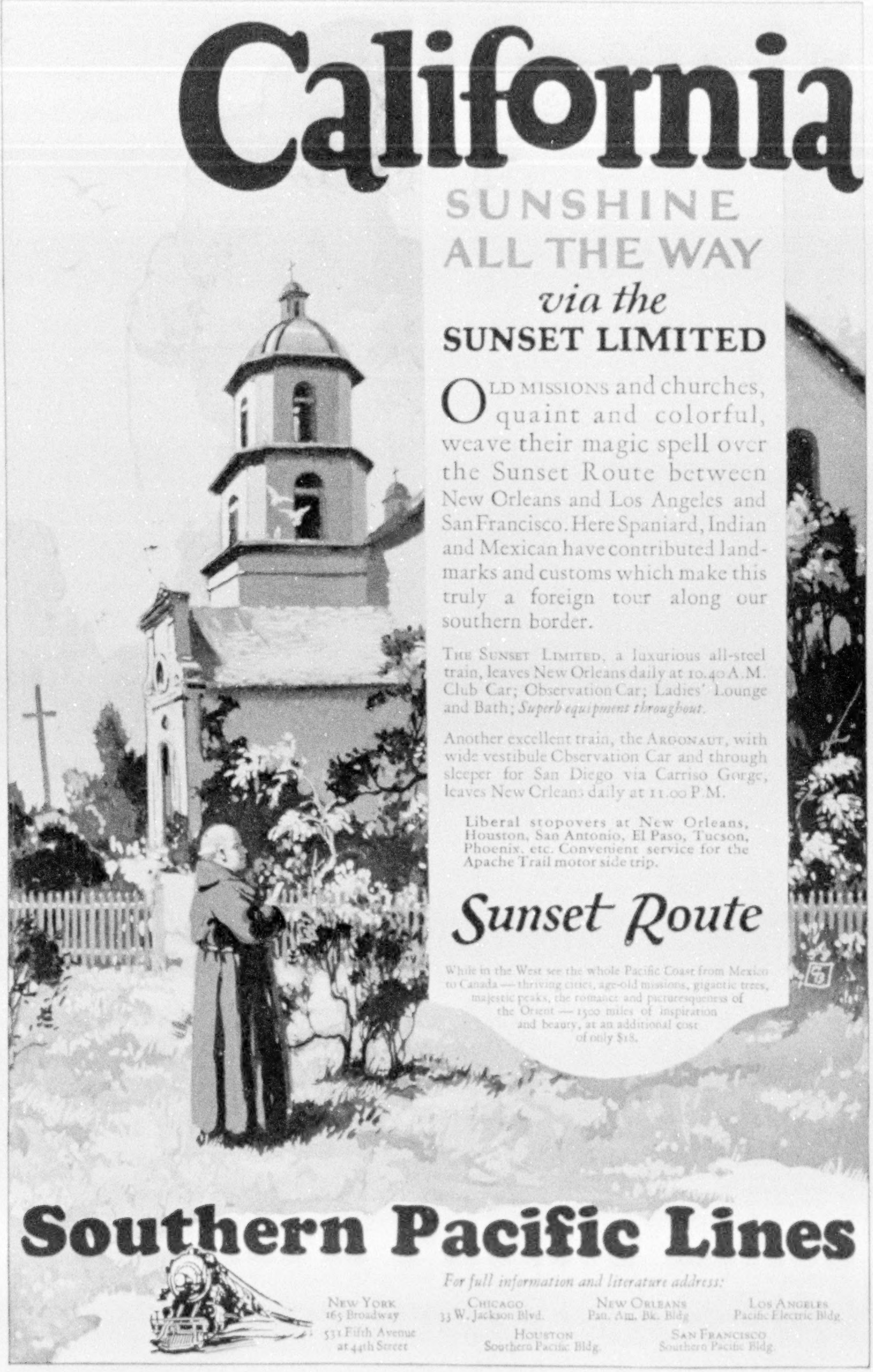

California

SUNSHINE ALL THE WAY

via the

SUNSET LIMITED

OLD MISSIONS and churches, quaint and colorful, weave their magic spell over the Sunset Route between New Orleans and Los Angeles and San Francisco. Here Spaniard, Indian and Mexican have contributed landmarks and customs which make this truly a foreign tour along our southern border.

THE SUNSET LIMITED, a luxurious all-steel train, leaves New Orleans daily at 10.40 A.M. Club Car; Observation Car; Ladies' Lounge and Bath; *Superb equipment throughout.*

Another excellent train, the ARGONAUT, with wide vestibule Observation Car and through sleeper for San Diego via Carriso Gorge, leaves New Orleans daily at 11.00 P.M.

Liberal stopovers at New Orleans, Houston, San Antonio, El Paso, Tucson, Phoenix, etc. Convenient service for the Apache Trail motor side trip.

Sunset Route

While in the West see the whole Pacific Coast from Mexico to Canada — thriving cities, age-old missions, gigantic trees, majestic peaks, the romance and picturesqueness of the Orient — 1500 miles of inspiration and beauty, at an additional cost of only $18.

Southern Pacific Lines

For full information and literature address:

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165 Broadway
531 Fifth Avenue
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NEW ORLEANS
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LOS ANGELES
Pacific Electric Bldg.

HOUSTON
Southern Pacific Bldg.

SAN FRANCISCO
Southern Pacific Bldg.

Eyes Need This Light

GLARING or misplaced lights hurt the eyes and hasten fatigue. They behave better and last longer when working in a light that suits them.

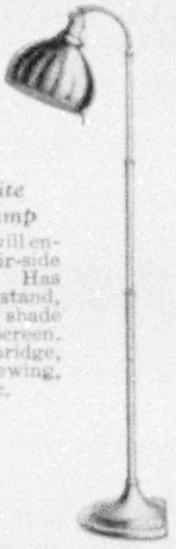
Emeralites keep minds alert by resting the eyes. Your business needs them to promote comfort and efficiency. Your home needs them for reading, writing or sewing.

Nature made green and daylight restful to eyes. That's why Emeralite has an Emerald Glass Shade and a special screen that changes ordinary electric light into soft, eye-saving daylite.

Most lighting fixtures designed for home use, are not suitable for reading or study. Emeralites look well, harmonize with any environment and provide the best working light.

Emeralite Bed Lamp
[Fits Any Bed]
Makes reading in bed delightful. The Emerald Glass Shade reflects a soft glow where you need it and eliminates glare. Has dimming socket with four changes of light—down to a mere glow for sick-room or night light.

Emeralite Floor Lamp
Your eyes will enjoy this chair-side companion. Has telescoping stand, adjustable shade and daylite screen. Ideal for bridge, reading, sewing, writing, etc.



Emeralite Junior
For those places the big lights don't reach. Adjustable green shade protects the eyes from glare. Just the light for reading, writing, sewing or study. Stands, hangs or clamps anywhere.

There is an Emeralite for every place and purpose. Booklet showing complete line in colors sent free upon request.

Genuine Emeralites are branded for your protection, and have the Emerald Glass Shade with the Daylite Screen. Buy them by name from department stores, office supply and electrical dealers.

H. G. McFADDIN & CO., 34 Warren St., N. Y.
Established 1874

EMERALITE
KIND TO EYES

Two reasons why people want this coffee

IF coffee isn't good, it isn't worth drinking. G. Washington's Coffee has that rich, fine flavor that appeals so strongly to the real coffee lover.

In addition to being a quality coffee, it comes to you ready to serve—this is a remarkable improvement in the fine art of having good coffee.

G. Washington's Coffee is a finished product—made for you by experts, perfectly percolated and vacuum dried—simply add hot or cold water.

Its great convenience, lack of work and trouble, make it the favorite coffee in the modern home.

A small can of G. Washington's Coffee will make as many cups of coffee as a can of ordinary coffee ten times its size—it is economical for home use.

Send for free trial size.

G. Washington's INSTANT COFFEE

G Washington's
INSTANT
COFFEE

G. WASHINGTON COFFEE
REFINING CO.
New York

It's the FLAVOR that Counts

Every drop of Heinz Tomato Ketchup is the pure, undiluted goodness of fresh tomatoes raised under Heinz supervision.

Such tomatoes! Luscious. Juicy. Vine ripened. Raised from pedigreed seed developed by Heinz. Picked the day they reach perfection. Skillfully spiced and cooked down, and bottled immediately.

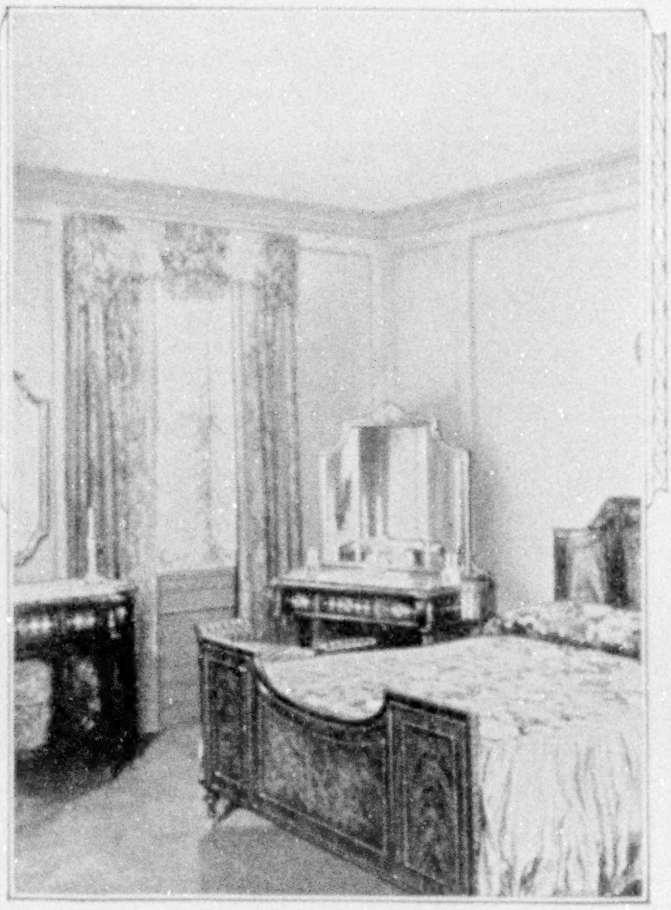
Such flavor! Special care and skill bring flavor to perfection in Heinz Tomato Ketchup. Appetizing. Delicious. Tempting. It makes the best of foods taste better and even dull foods a delight to the appetite.

The taste is the test · *H. J. HEINZ CO.*

HEINZ tomato KETCHUP 57

AND REMEMBER—HEINZ 57 VARIETIES ARE REASONABLE IN PRICE

Like a Colonial Lady



Your Furniture Can Grow Old Gracefully

American Walnut makes furniture "livable," as no other wood can—and it is economical. As settings are rearranged, as surroundings change, as background colors are varied, Walnut furniture always remains at ease. And, like a Colonial lady, it knows how to add a charm and grace to the art of growing old.

The scuffs, the scars, the scratches, that soon mar ordinary woods and walnut imitations, cannot deface the deep rich color of a true Walnut surface.

Send the coupon today for our recent booklet, "The Story of American Walnut." It tells how imitations are detected, and how the genuine is used.

AMERICAN WALNUT MANUFACTURERS ASS'N
Room 2701, 616 So. Michigan Avenue, Chicago, Ill.

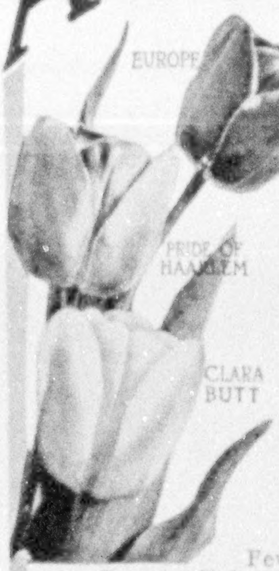
Please send me your brochure on American Walnut.

Name..............

Address..............

AMERICAN WALNUT

A Garden Full of Darwin Tulips for $2.00



In anticipation of again placing before our customers a collection of Darwin Tulips we have had a sufficient quantity grown so that we can offer

50 Giant Darwin Tulip Bulbs, Finest Mixed, for $2.00

selected from fifteen named varieties

Few spring flowering plants rival the Darwin Tulip for brilliance of bloom. Borne on strong stems often exceeding three feet. They are a wonderful addition to the flower garden.

Plant any time before the ground becomes frozen, and they will bloom from the middle of May to Decoration Day

Mention this advertisement and send check, money order, cash or stamps and secure this exceptional collection, sent prepaid to any point in the U. S. east of the Mississippi. For points West and Canada add 25c ($2.25)

Our 1927 Fall Bulb Catalogue sent on request

Stumpp & Walter Co

30 and 32 Barclay Street New York

Look Inside the Piano for this Trade-Mark

WESSELL, NICKEL & GROSS
NEW YORK
TRADE MARK

The Sign of the World's Standard Piano Action

To Make Sure of A Quality Piano—

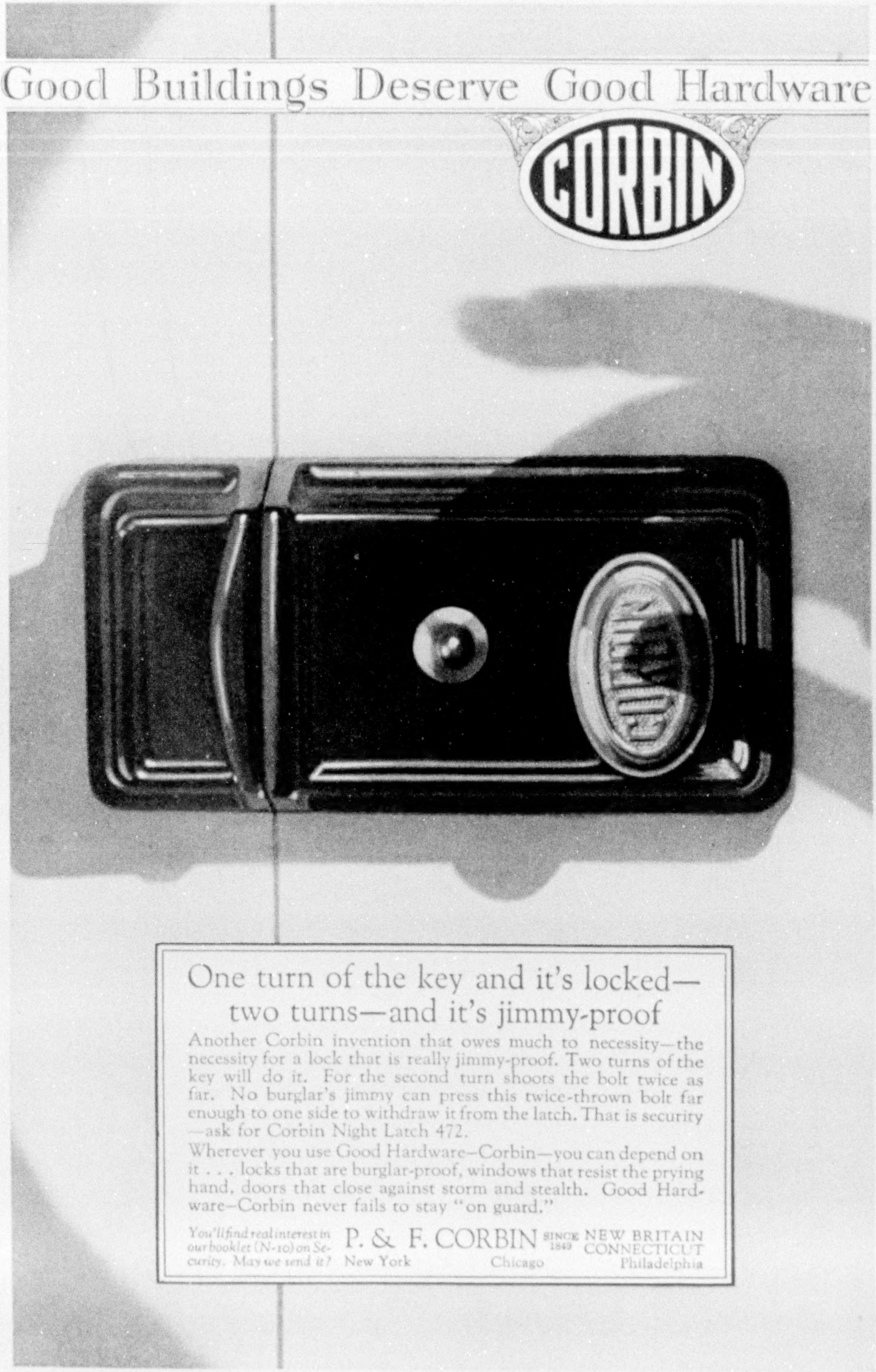
THE new piano for your home will be a quality instrument if you take care to select a make containing the famous Wessell, Nickel & Gross piano action. For this fine action is never found in a piano of doubtful worth.

The *piano* action is the piano's most vital part. It must be delicately responsive yet built to stand years of usage. The Wessell, Nickel & Gross action is made by the oldest, largest and leading makers of high-grade piano actions. It is the *world's highest-priced piano action.* It is today the choice of America's leading piano makers—and has been since 1874.

WESSELL, NICKEL & GROSS

Established 1874 New York City

When you Buy an Upright, Grand, Player or Reproducing Piano— Insist on the Wessell, Nickel & Gross Piano Action.



One turn of the key and it's locked— two turns—and it's jimmy-proof

Another Corbin invention that owes much to necessity—the necessity for a lock that is really jimmy-proof. Two turns of the key will do it. For the second turn shoots the bolt twice as far. No burglar's jimmy can press this twice-thrown bolt far enough to one side to withdraw it from the latch. That is security —ask for Corbin Night Latch 472.

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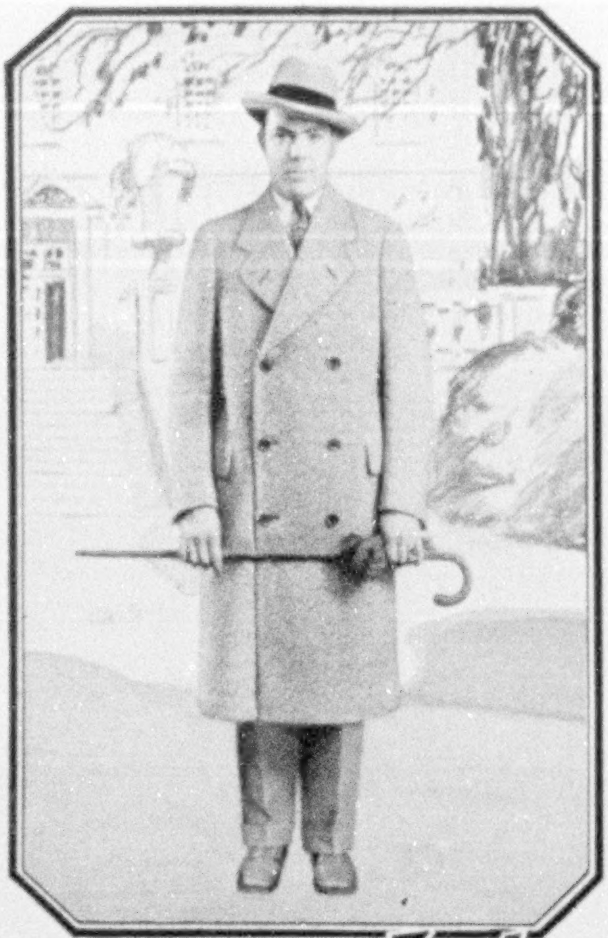

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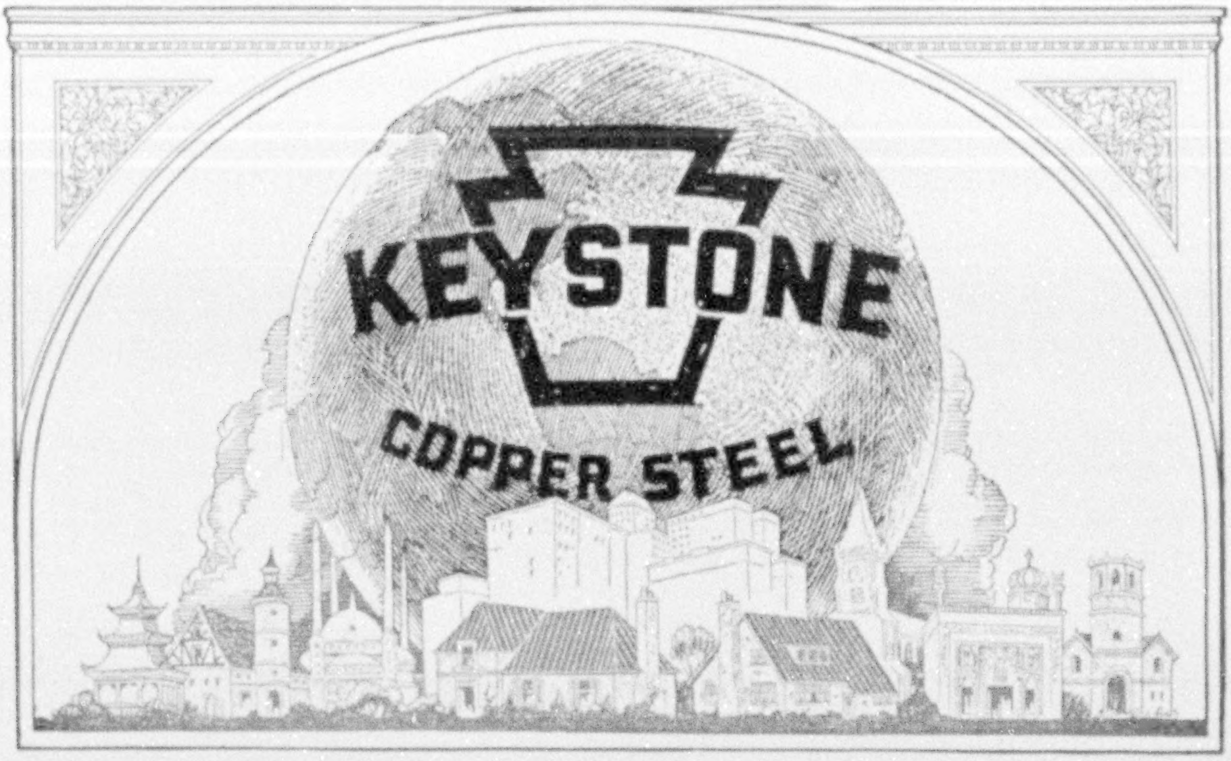

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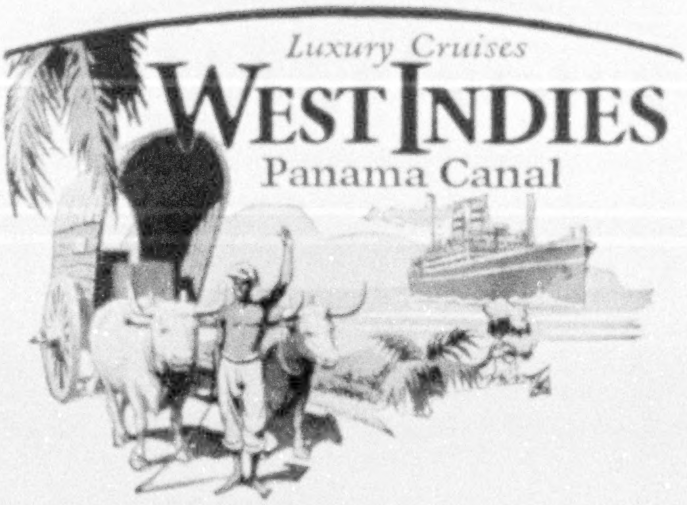

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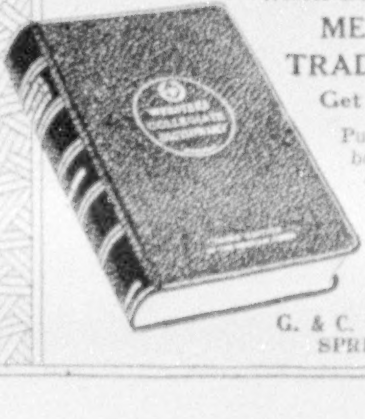

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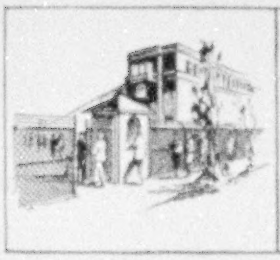

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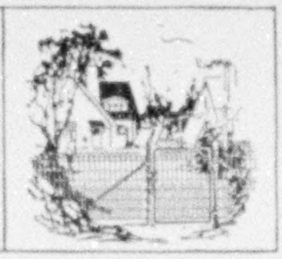

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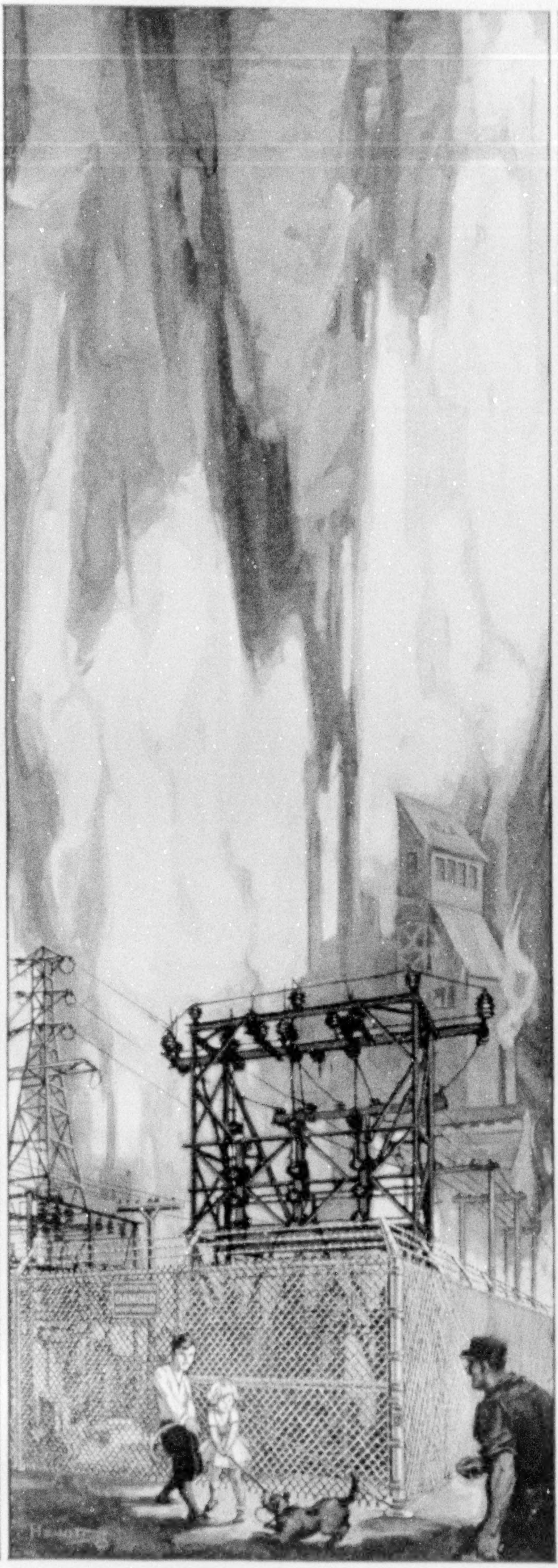
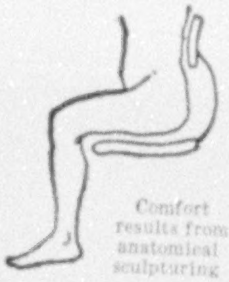


If Your Body Were Built Like a Jackknife—

Good seating is not mechanical



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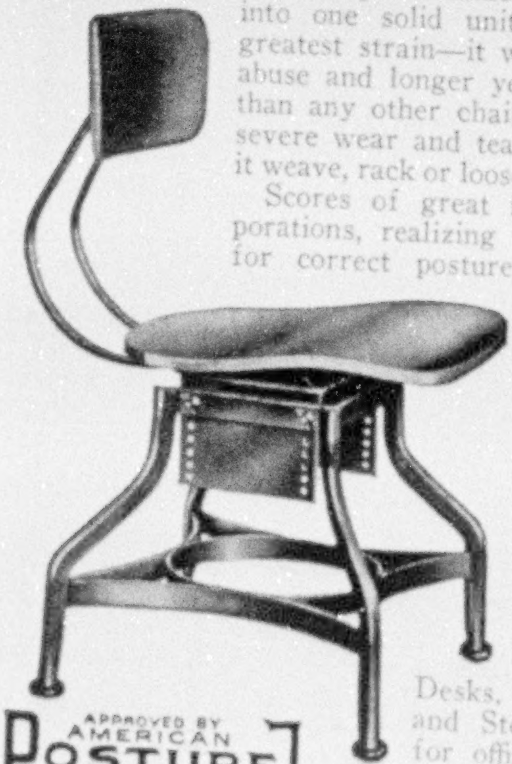

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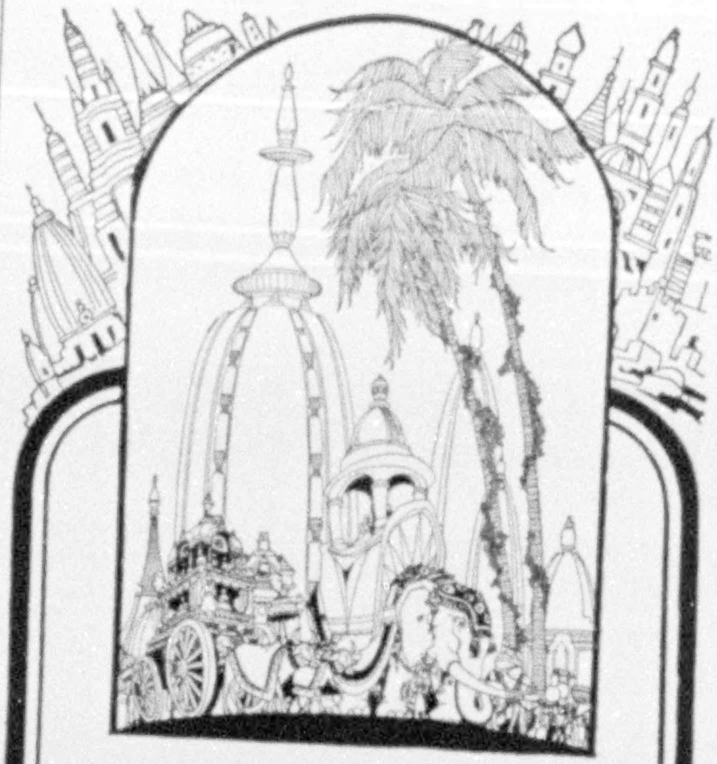

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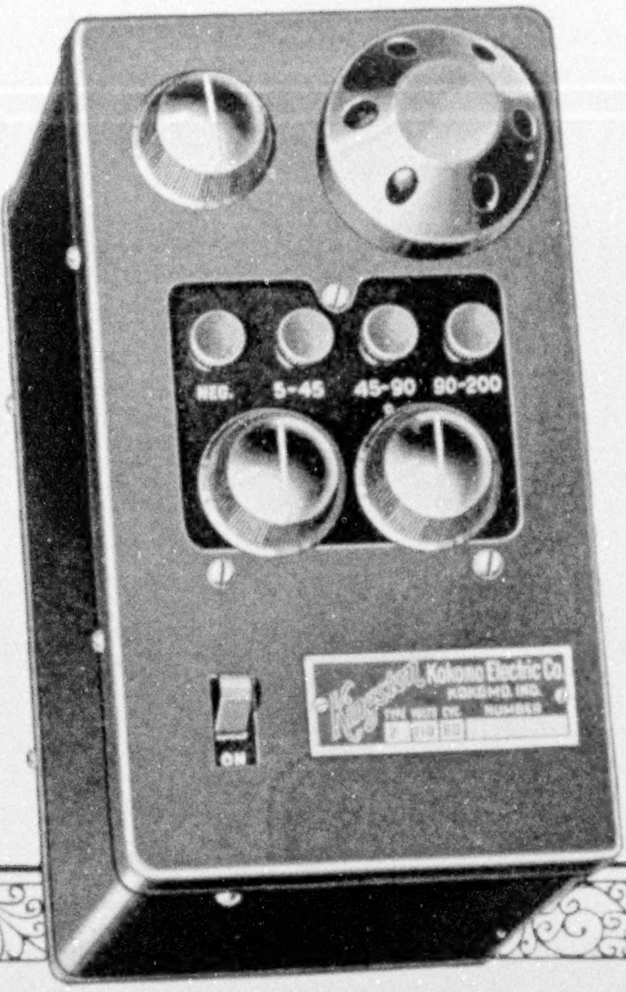

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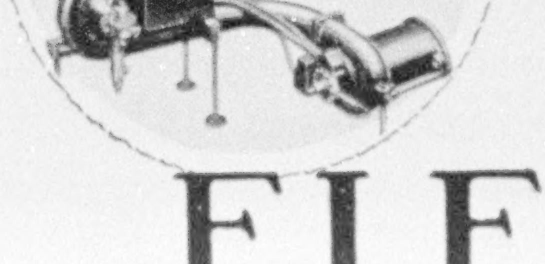

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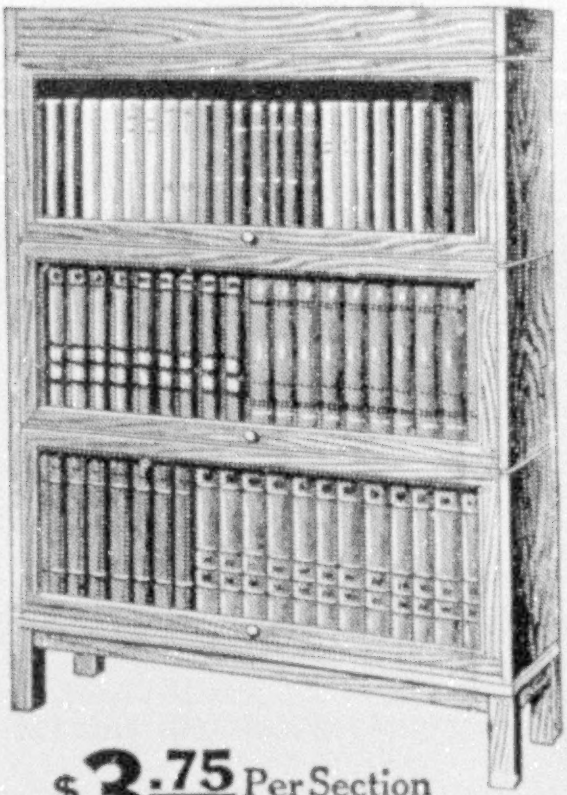

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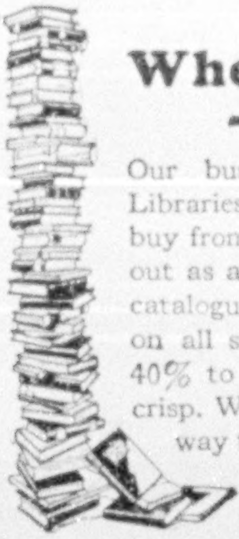

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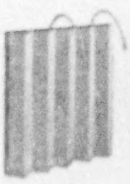

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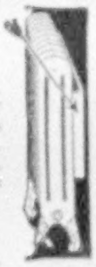

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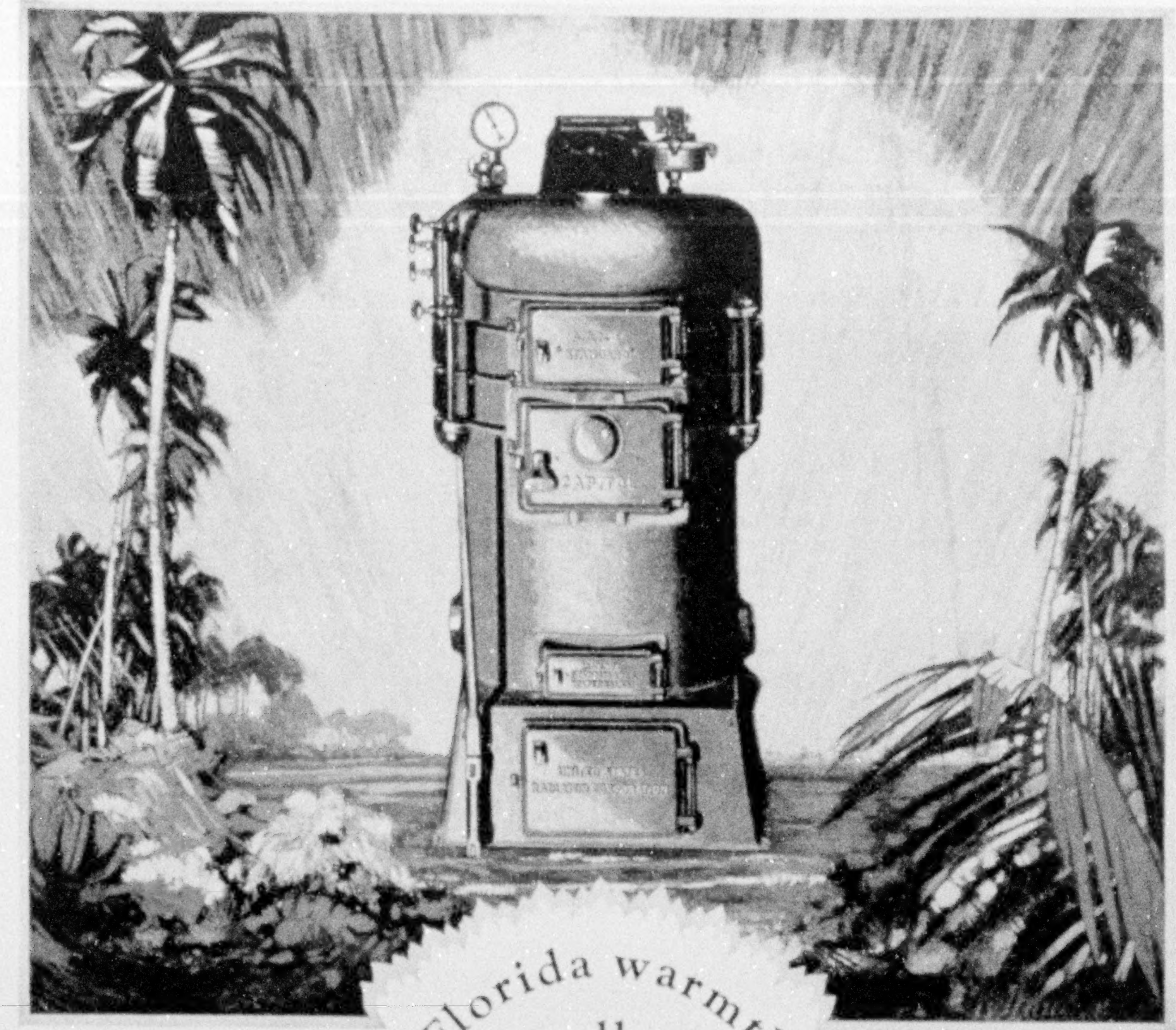

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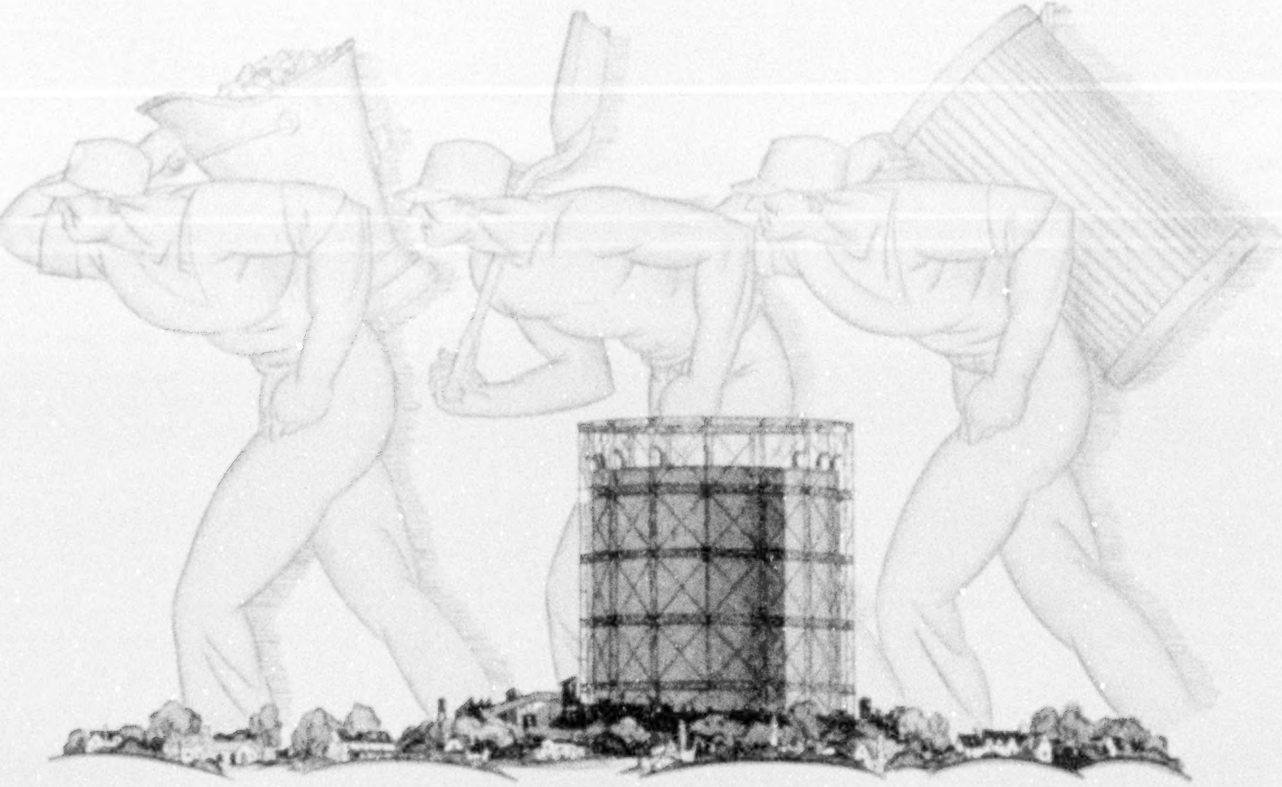

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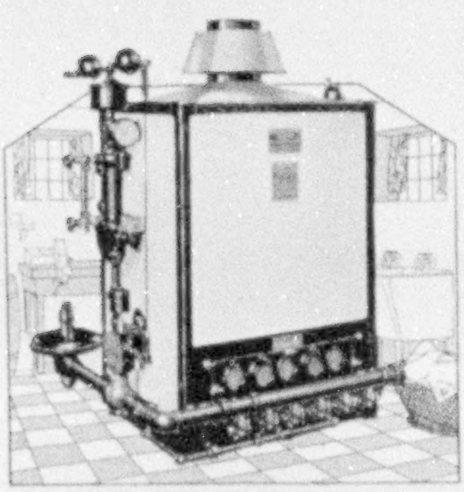

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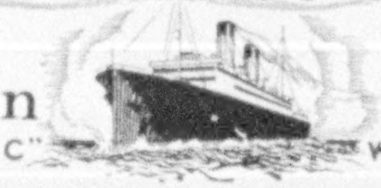

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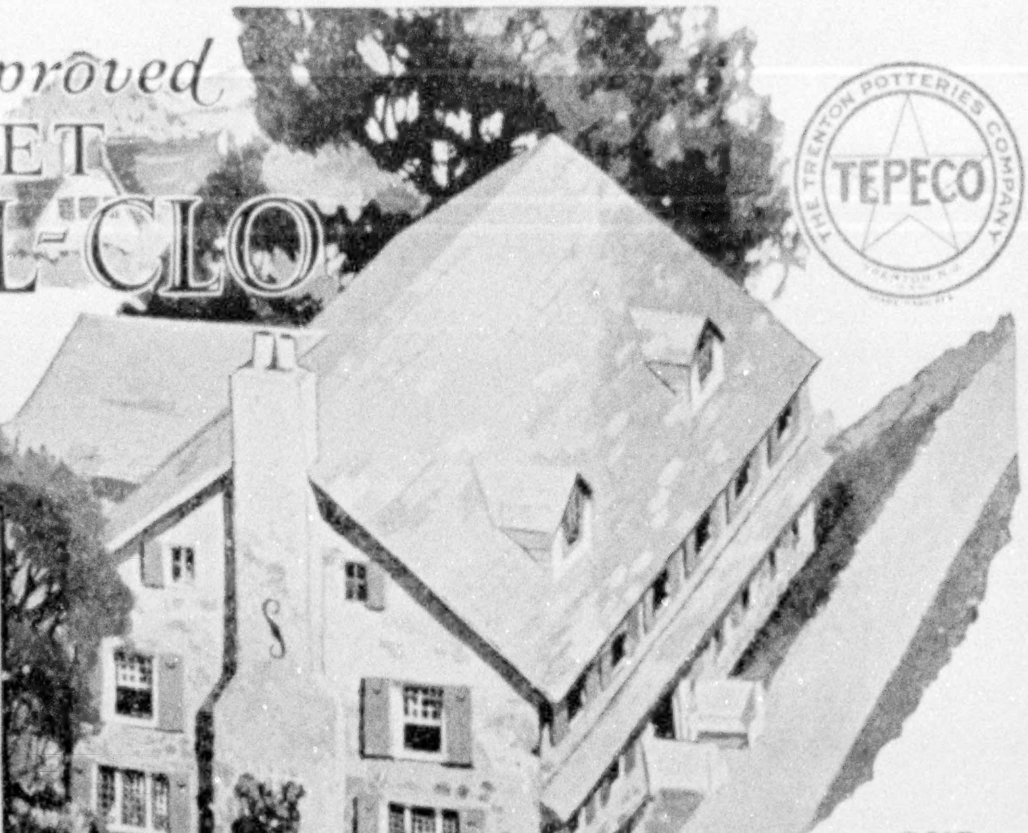

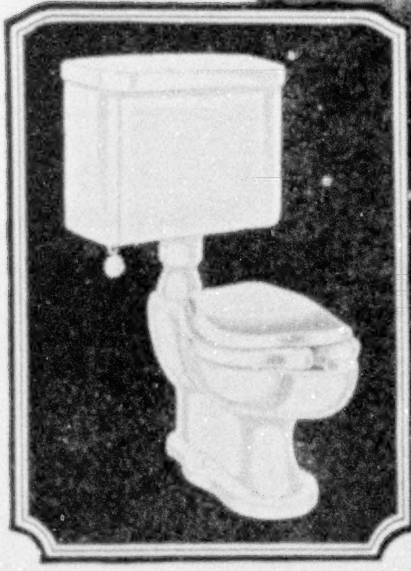

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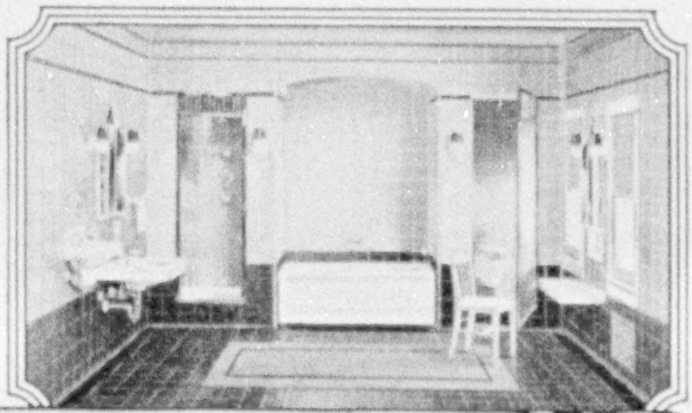

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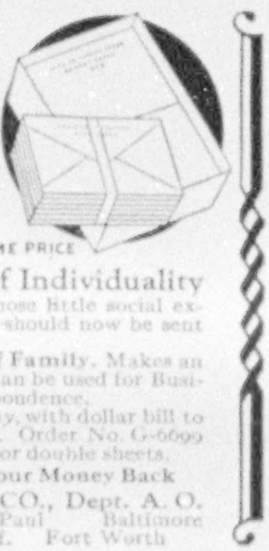

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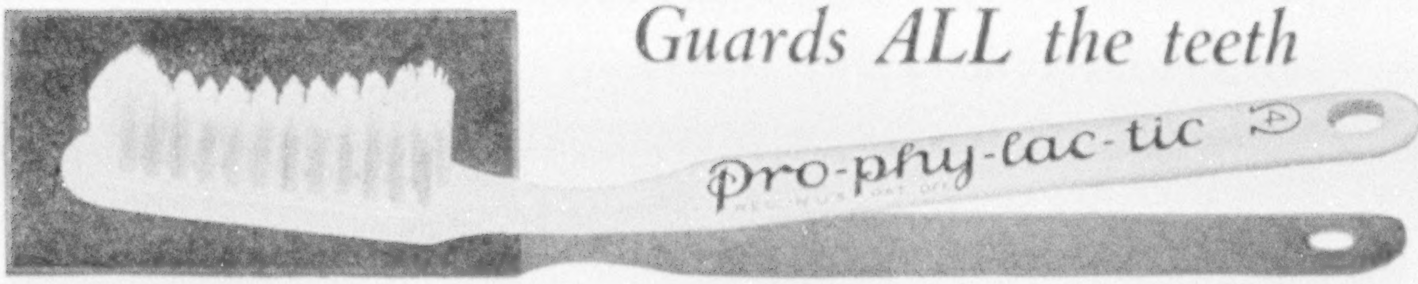

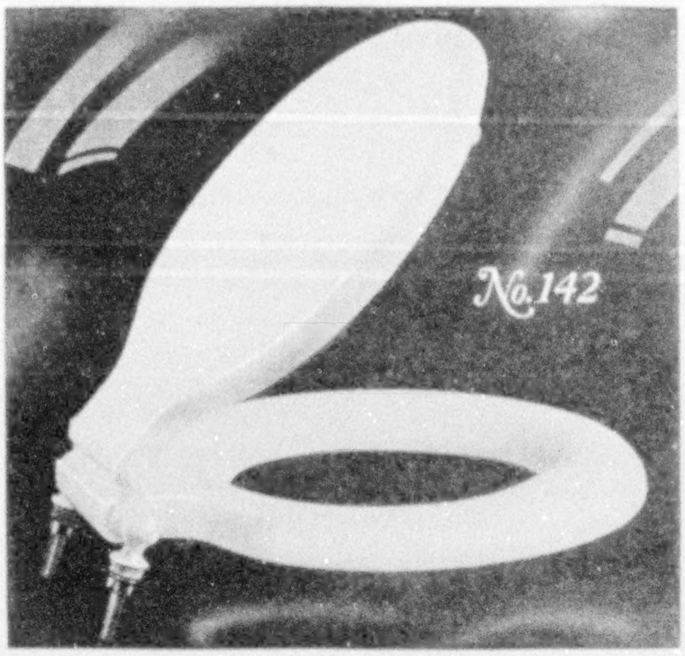

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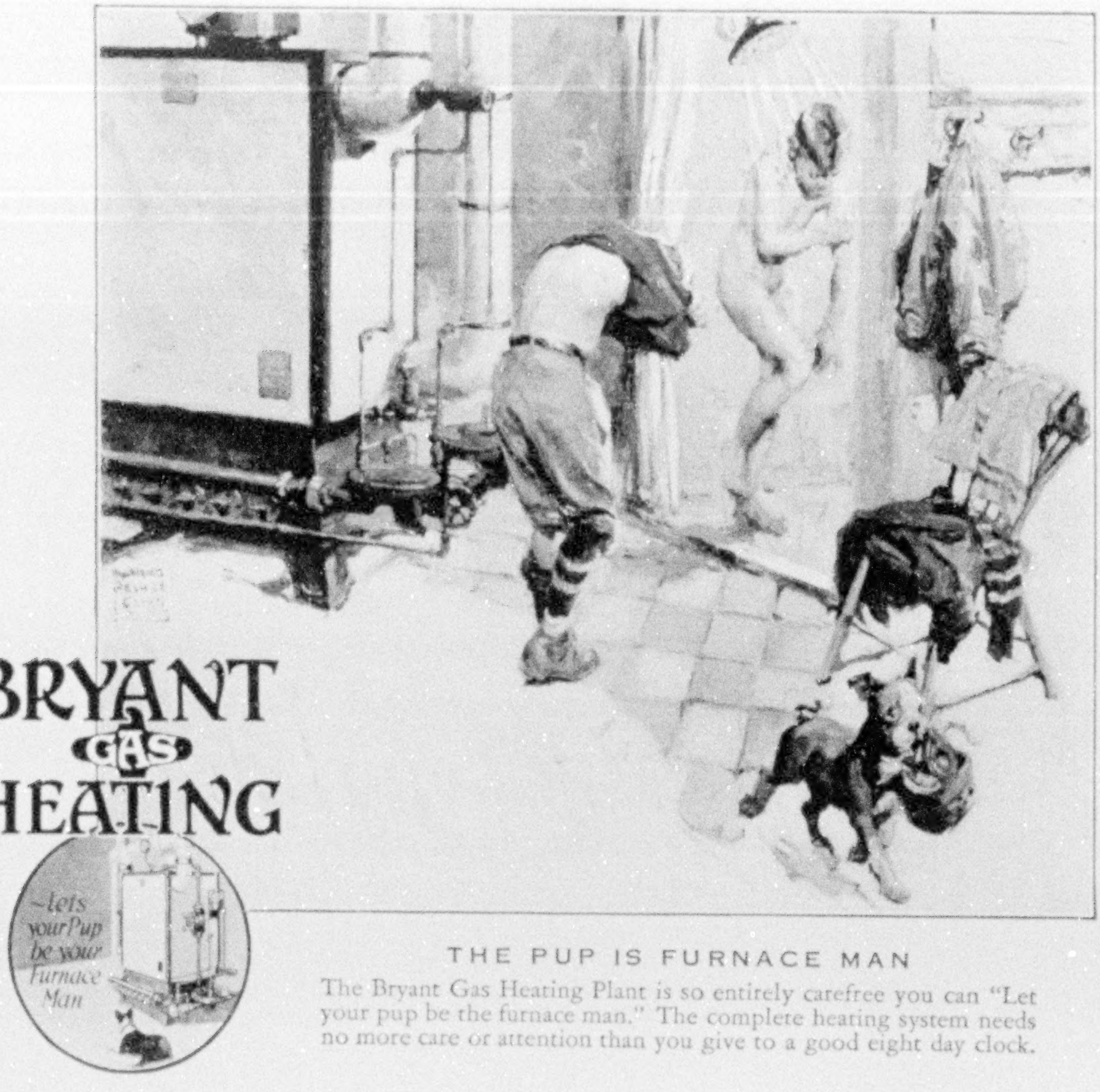
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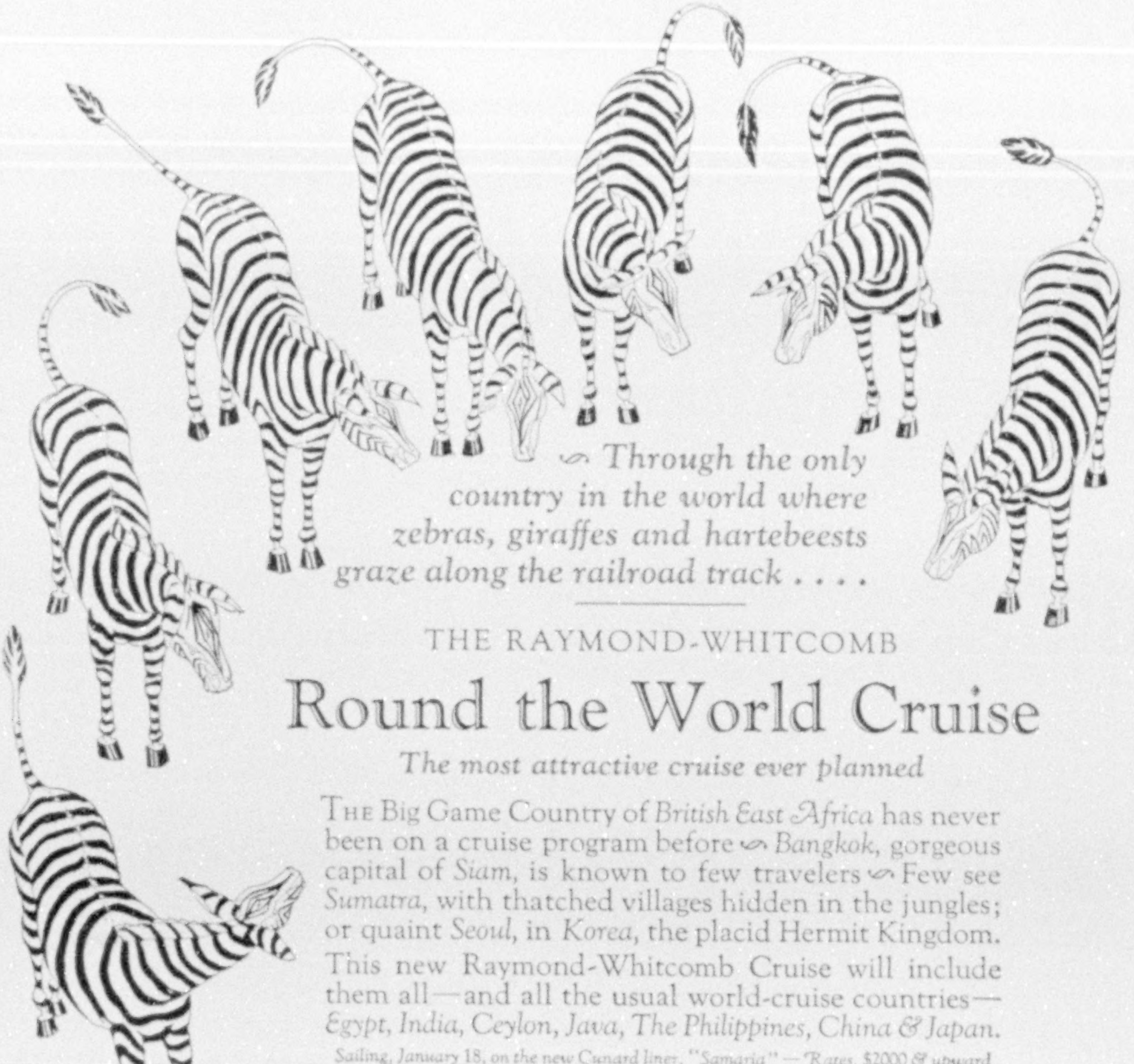

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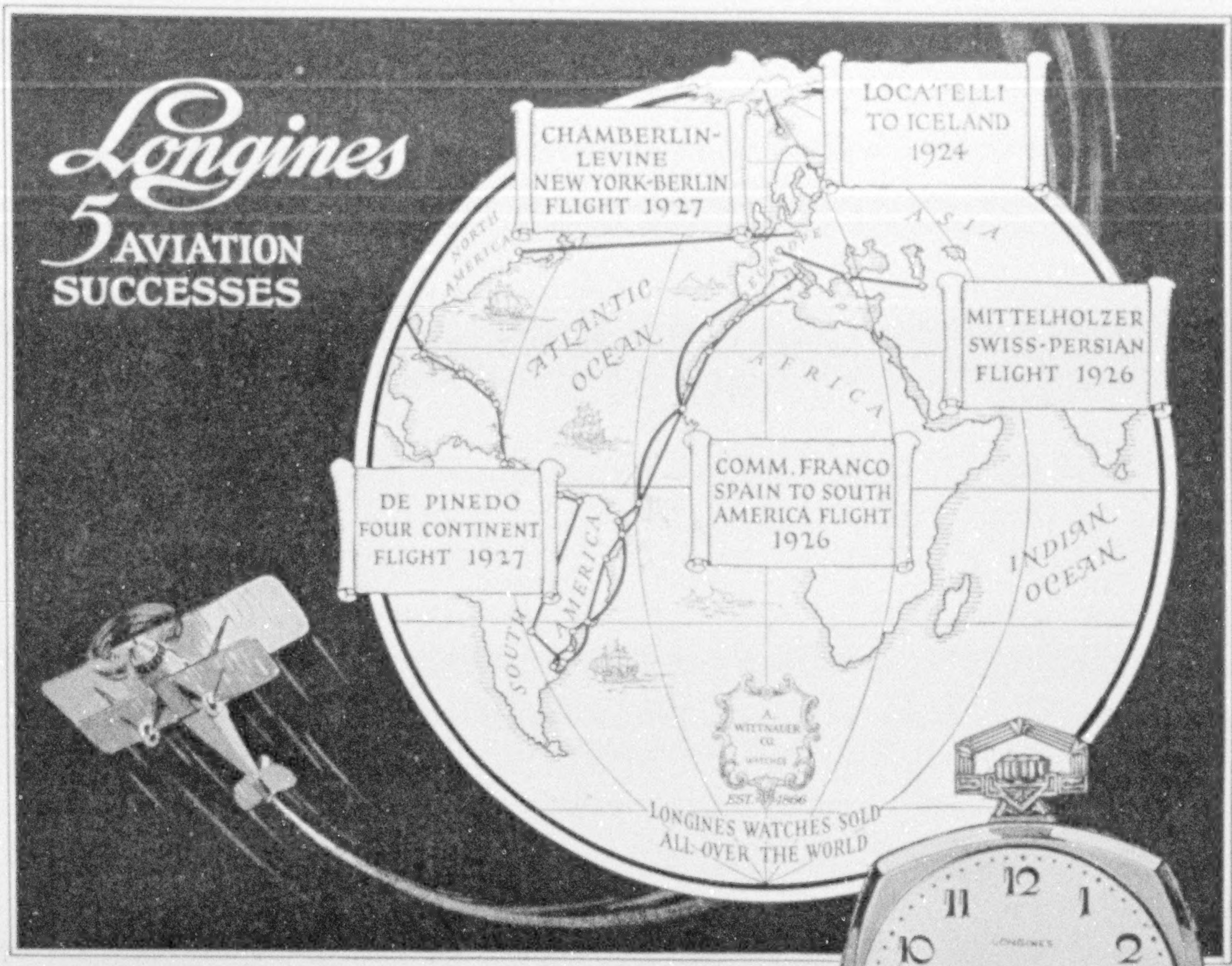
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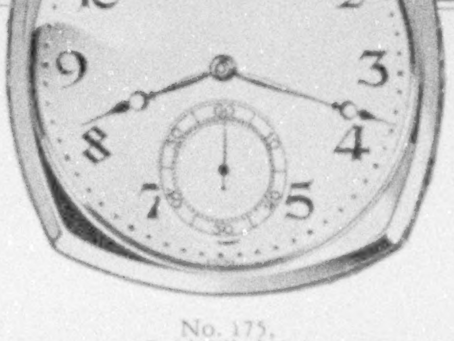
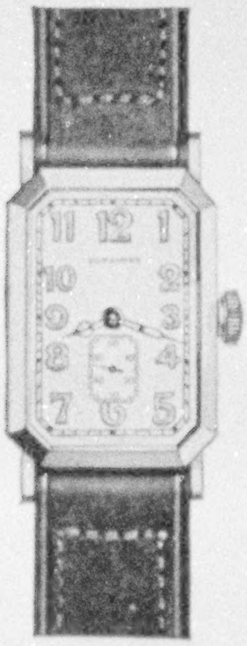
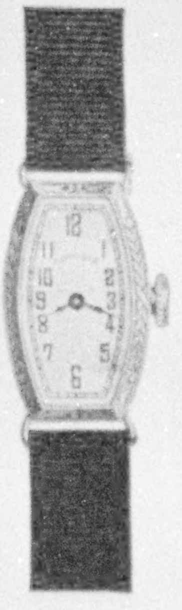
LONGINES WATCHES SOLD ALL OVER THE WORLD



No. 175,
Gold Filled, $35
14 kt. Gold,
$100 and up



No. 162,
Gold Filled, $60
14 kt. Gold,
$100



No. 159, White
Gold Filled, $70
18 kt. White
Gold, $100

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U. S. Naval Observatory, Washington, D. C.—Since 1916 more Longines passed and were accepted than all other competing watches combined. The official watch for U. S. Naval Torpedo Boat Service.

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THE OBSERVATORY
WATCH

Official Government Observatory Awards in Accuracy Contests

Geneva Observatory, Switzerland.—In 1925 Longines again received first prize of series, duplicating results of 1923 and 1924.

Kew-Teddington Observatory, England.—141 awards in Accuracy Contests since 1910 (1918 year's record for the best performance). Since 1919 every Longines Watch submitted passed trial with mention "especially good."

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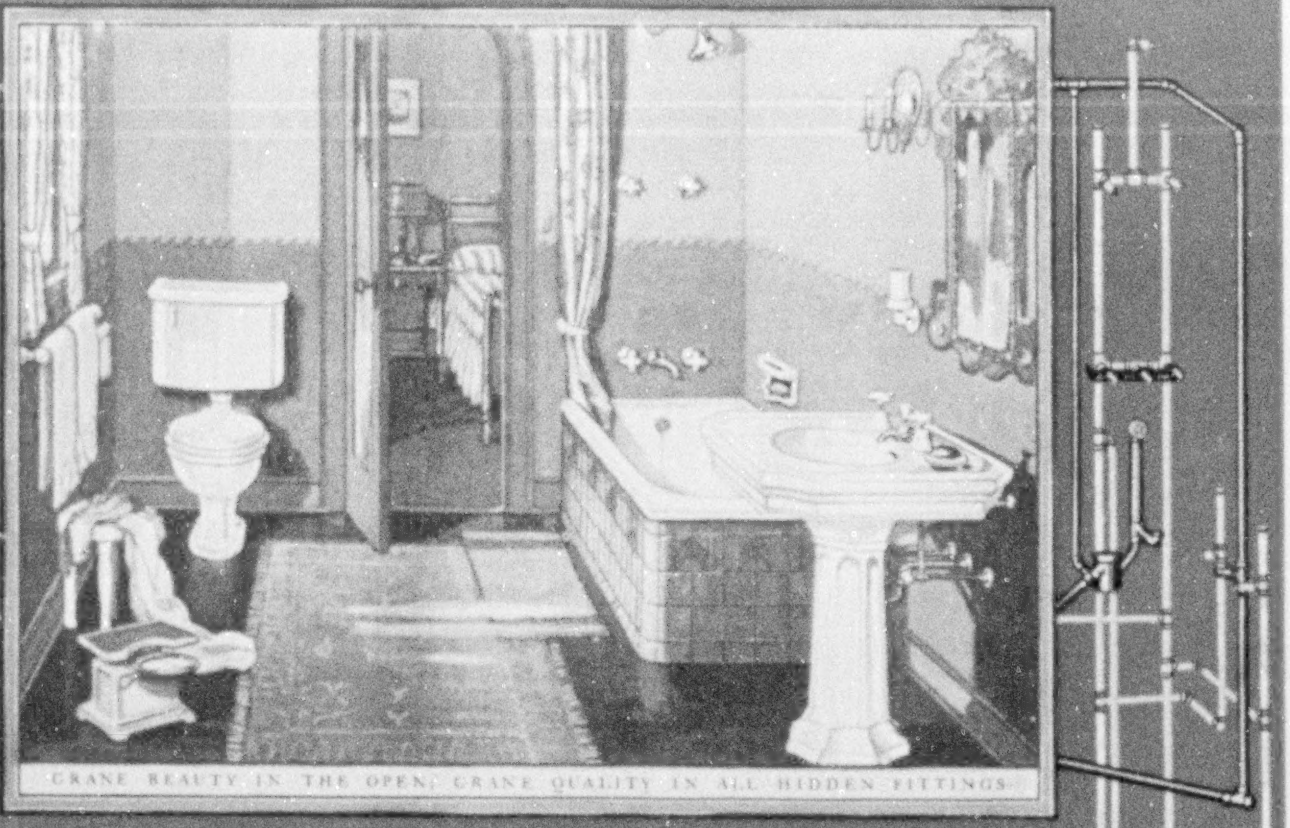

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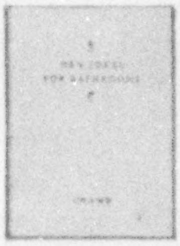

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